

2013-1661

In The
United States Court of Appeals
For The Federal Circuit

TECHNOLOGIES HOLDINGS CORP.,

Appellant,

v.

ABATEMENT TECHNOLOGIES, INC.,

Appellee.

**APPEAL FROM THE UNITED STATES PATENT AND TRADEMARK
OFFICE, PATENT TRIAL AND APPEAL BOARD IN REEXAMINATION
NO. 95/001,362**

BRIEF OF APPELLANT

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STATUTES

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STATEMENT OF RELATED CASES

(Fed. Cir. R. 47.5)

There are no other prior or pending appeals, reexaminations or interferences involving U.S. Patent No. 7,246,503.

On April 17, 2009, Appellant, Technologies Holdings Corp. ("Technologies Holdings") and its licensee, Therma-Stor, LLC, filed suit against Appellee, Abatement Technologies, Inc. ("Abatement"), for infringement of patents, including the U.S. 7,246,503 patent, in the United States District Court for the Western District of Wisconsin, 3:09-cv-229. (A1936.) On September 14, 2009, an amendment was made to the complaint to add Applied Comfort Products, Inc. as a defendant. (A1940.) On January 6, 2010, Technologies Holdings Corp. and Therma-Stor, LLC moved to transfer the case to the Northern District of Georgia, granted by the Court on February 2, 2010. (A1942.)

On January 6, 2010, Technologies Holdings Corp. and its licensee, Therma-Stor, LLC, filed suit for infringement of patents, including the '503 patent, against Abatement Technologies, Inc. and Applied Comfort Products, Inc. in the United States District Court for the Northern District of Georgia, 1:10-cv-35. (A1929.)

The transferred Wisconsin suit was lodged on February 3, 2010 in the United States District Court for the Northern District of Georgia, 10-cv-292.

(A1921.) On March 9, 2010, the United States District Court for the Northern District of Georgia consolidated the two cases with the first-filed case (10-cv-35) continuing on while the second-filed case (10-cv-292) was administratively closed as of March 9, 2010. (A1928.)

On May 26, 2010, the parties filed (10-cv-35) a Stipulation and Consent Order staying the District Court litigation pending the outcome of the reexamination proceedings. On June 1, 2010, the Georgia District Court administratively closed the court proceedings pending the outcome of the reexamination proceedings. (A1935.)

There are no other prior or pending appeals, reexaminations, interferences or judicial proceedings known to Technologies Holdings.

STATEMENT OF SUBJECT MATTER AND JURISDICTION

(Fed. Cir. R. 47.6)

This appeal involves *Inter Partes* Reexamination No. 95/001,362 involving United States Patent No. 7,246,503 (hereafter "the '503 patent").

On July 26, 2013, Technologies Holdings filed a Notice of Appeal (A1961-1963) of the Decision on Appeal (A1-26; A1948-1960¹) rendered May 28, 2013 by the Patent Trial and Appeal Board of the United States Patent and Trademark Office (hereafter "Board"), docketed on September 19, 2013 under Appeal No. 2013-1661.

Jurisdiction is proper under 28 U.S.C. § 1295(a)(4)(A) and 35 U.S.C. § 141.

¹ *Abatement Technologies, Inc. v. Technologies Holdings Corp.*, 213 Pat. App. LEXIS 3388 (B.P.A.I. May 28, 2013).

I. STATEMENT OF THE ISSUES

A. Whether the USPTO erred in affirming the Examiner's rejection of claims 12, 25 and 26 of U.S. Patent No. 7,246,503 (hereafter "the '503 patent").

1. Abatement and the USPTO (i.e., Board and Examiner) failed to meet their burden in establishing a *prima facie* case of obviousness:

- a. The USPTO erred in claim construction, an issue of law;
- b. The USPTO erred by hindsight reconstructions and *ex post* reasoning derived from the '503 patent.

2. The USPTO erred by rejecting unexpected results as irrelevant and immaterial to the question of obviousness:

- a. The USPTO erred in requiring the advantages to be set forth in the patent claims in order to support unexpected results;
- b. The USPTO erred in requiring Technologies Holdings to construct a hypothetical model for comparative testing against the invention in order to support unexpected results.

3. The USPTO erred by failing to recognize the financial interest and bias behind Mr. Brown's Declaration, which should have been rejected or given little or no weight.
4. The Examiner/Board was misled by Abatement concerning the Orion publication and the Harris U.S. 2,682,758 patent (hereafter "the Harris '758 patent").

II. STATEMENT OF THE CASE

A. Nature of the Case

This case involves an appeal by Appellant, Technologies Holdings Corp., of the Decision on Appeal (A1-25) rendered by the Patent Trial and Appeal Board of the United States Patent and Trademark Office on May 28, 2013, affirming the Examiner's rejection of claims 12, 25 and 26 of U.S. Patent No. 7,246,503. The technology involves dehumidifiers, particularly dehumidifiers with bypass air flow technology utilizing particular flow paths that permit the dehumidifiers to operate more efficiently at certain temperatures.

B. Course of Proceeding and Disposition Below

On May 26, 2010, Appellee, Abatement Technologies, Inc., filed a Request for *Inter Partes* Reexamination (A102-103), with an attached Information Disclosure Statement (A209-211) that failed to mention the Harris '758 patent.

On June 29, 2010, the USPTO entered an Order granting the Request for *Inter Partes* Reexamination (A741-743) along with an Office Action noting that patent claims 4-7 and 16-24 were not subject to reexamination, but rejecting claims 1-3 and 8-15 of the '503 patent. (A776.)

Subsequently, numerous exchanges occurred between Technologies Holdings, Abatement and the USPTO including the following:

1. July 28, 2010: Technologies Holdings amended claims 1, 4, 6, 10, 13 and 14, cancelled claims 3, 8 and 9; claims 2, 5, 7, 11, 12 and 15-24 remained unchanged. (A797-798, A958-965.)
2. July 28, 2010: Technologies Holdings submitted the Declaration of Timothy S. O'Brien (A845-850), including a claim chart concerning the infringing Aqua-Trap dehumidifier. (A922-956.)
3. August 26, 2010: Abatement submitted "Third Party Comments After Patent Owner Response" (A968-1003), which was devoid of any reference to the Harris '758 patent.
4. November 30, 2010: USPTO submitted a non-final Office Action noting that claims 4-7 and 16-24 were not subject to reexamination, and rejecting claims 1, 2 and 10-15. (A1036-1037.)

5. December 30, 2010: Technologies Holdings filed a "Response/Amendment" converting claims 4, 6 and 12 to independent form, adding new claims 25 and 26, cancelling 1-3, 8-11 and 13-15, and leaving claims 5, 7 and 16-24 remained unchanged. (A1071-1072, A1123-1132.)
6. December 30, 2010: Technologies Holdings submitted the Second Declaration of Timothy S. O'Brien. (A1134-1143.)
7. January 18, 2011: Abatement submitted the "Declaration of Michael Brown", Vice President of Engineering of Applied Comfort Products, Inc. (hereafter "Applied Comfort"), disclosing the Harris '758 patent for the very first time. (A1206.) Mr. Brown and Abatement failed to disclose to the USPTO that Applied Comfort was sued for infringement of the '503 patent in the underlying litigation based on a product designed under the direction of Michael Brown (A1204-1209), and failed to disclose that Mr. Brown had a pending U.S. patent application claiming an invention having an air flow bypass in a dehumidifier. (A1607-1625.)
8. January 31, 2011: Abatement submitted its "Third Party Comments After Patent Owner Response". (A1162-1202.)

9. February 14, 2011: USPTO submitted a Notice Re Defective Paper in *Inter Partes* Reexamination, specifically referring to the December 30, 2010 amendment filed by Technologies Holdings to address the amendment of claims not in the reexamination. (A1231-1234.)
10. March 14, 2011: Technologies Holdings resubmitted a corrected December 30, 2010 amendment. (A1235-1244.)
11. July 15, 2011: USPTO submitted an Office Action holding that the remarks submitted by Abatement on January 31, 2011 did not comply with the rules and regulations because the newly proposed rejections were unclear and incomplete. (A1248-1250.)
12. July 27, 2011: Abatement submitted a "Replacement Submission of Third Party Comments After Patent Owner Response" to replace its January 31, 2011 comments responsive to the Office Action of November 30, 2010 and Technologies Holdings' response/amendment submitted on December 30, 2010. (A1251-1295.) Abatement resubmitted the January 18, 2011 "Declaration of Michael Brown". (A1297-1302.)

13. September 7, 2011: USPTO submitted an Action Closing Prosecution (ACP), noting that claims 4-7 and 16-24 were not subject to reexamination, that claims 2, 8-11 and 13-15 were cancelled, and that claims 12, 25 and 26 were rejected. (A1325-1327.)
14. September 7, 2011: the Examiner submitted a "Notice of References Cited" wherein the Examiner, for the very first time in the entire proceeding, listed the Harris '758 patent. (A1375.)
15. October 7, 2011: Technologies Holdings submitted "Amendments to the Claims" amending claims 25 and 26, but not claim 12. (A1377-1378.)
16. October 7, 2011: Technologies Holdings submitted a Third Declaration of Timothy S. O'Brien. (A1396-1400.)
17. November 7, 2011: Abatement submitted Third Party Comments After Patent Owner Response. (A1404.)
18. November 7, 2011: Abatement submitted a "Second Declaration of Michael Brown". (A1435-1439.)
19. December 16, 2011: The USPTO submitted a Right of Appeal Notice (RAN) (A27-29) refusing to enter Technologies Holdings' October 7, 2011 Amendments, O'Brien's October 7,

2011 Declaration, and Abatement's November 7, 2011 Response. (A30.)

20. January 13, 2012: Technologies Holdings filed a Notice of Appeal to the Board of Patent Appeals and Interferences. (A1451.)
21. March 13, 2012: Technologies Holdings' Brief on Appeal was filed. (A1459.)
22. April 12, 2012: Abatement submitted its Respondent Brief. (A1867.)
23. May 4, 2012: USPTO submitted its "*Inter Partes* Reexamination Examiner's Answer". (A1888-1891.)
24. June 4, 2012: Technologies Holdings' Rebuttal Brief on Appeal was submitted. (A1893-1901.)
25. May 28, 2013: Decision on Appeal rendered. (A1-26.)

III. STATEMENT OF THE FACTS

A. The '503 Patent Specification

The '503 patent sets forth specific air flow paths within a cabinet (30) of a dehumidifier (10) having an evaporator coil (18), a condenser coil (14), and a heat exchanger (26) having first (26a) and second (26b) heat exchange paths. (A80-96.)

With respect to the embodiment in Figures 6-10 of the '503 patent, an air flow path (32) includes three air flow segments connected in series, namely:

- a first segment (34) passing ambient air to the evaporator coil (18),
- a second segment (36) passing air from the evaporator coil (18) to the condenser coil (14), and
- a third segment (38) discharging air from the condenser coil (14).

The air flow path (32) also includes:

- a fourth segment (62) passing ambient air to the condenser coil (14).

The fourth segment (62) of the air flow path (32) is in parallel flow configuration (i.e., not in series) with the second segment (36) of the air flow path (32) [A94 col. 3 l. 2-4].

The '503 patent further parses the first (34) and second (36) air flow segments. The first segment (34) includes:

- a first subsegment (34a) supplying ambient air to the first heat exchange path (26a) of the heat exchanger (26) and
- a second subsegment (34b) supplying air from the first heat exchange path (26a) of the heat exchanger (26) to the evaporator coil (18).

The second segment (36) includes:

- a third subsegment (36a) supplying air from the evaporator coil (18) to the second heat exchanger path (26b) of the heat exchanger (26) and
- a fourth subsegment (36b) supplying air from the second heat exchange path (26b) of the heat exchanger (26) to the condenser coil (14).

The fourth segment (62) of the air flow path (32) is in geometrically parallel configuration with each of the first subsegment (34a) and a substantial portion of the fourth subsegment (36b) of the air flow path (32) (A94 col. 3 l. 17-19), and is geometrically perpendicular to the second heat exchange path (26b). (A86.)

The fourth segment (62) of the air flow path (32) merges with the fourth subsegment (34b) downstream of the second heat exchange path (26b) of the heat exchanger (26) and upstream of the condenser coil (14). (A94.)

B. Claims 12, 25 and 26 of the '503 Patent

The claims below are annotated to the specification by column and line number, and to the drawing, if any, by reference characters. (A1459, A1463-66.) While claims 12, 25 and 26 have been annotated to reflect structures and/or sequences disclosed in the specification, such annotations are not to be construed as limiting the claim language to the preferred embodiments set forth in the '503 patent.

Independent claim 12 defines:

12. A dehumidifier (10) comprising: a cabinet (30) [A94 col. 3 l. 19; A86 fig. 8]; a compressor (12) [A86 fig. 8] in said cabinet (30) for delivering hot compressed refrigerant; a condenser coil (14) [A94 col. 3 l. 2; A86 fig. 8] in said cabinet (30) and receiving refrigerant from said compressor (12) and condensing same; an expansion device (16) [A86 fig. 8] in said cabinet (30) and receiving refrigerant from said condenser coil (14) and expanding same; an evaporator coil (18) [A94 col. 3 l. 8; A86 fig. 8] in said cabinet (30) and receiving refrigerant from said

expansion device (16) and evaporating same, and delivering said refrigerant to said compressor (12); said refrigerant being circulated from said compressor (12) to said condenser coil (14) to said expansion device (16) to said evaporator coil (18) and back to said compressor (12) in a refrigeration cycle [A94 col. 3 l. 1-38]; said cabinet (30) having an air flow path (32) [A86 fig. 8] therethrough comprising: a first segment (34) passing ambient air to said evaporator coil (18); a second segment (36) passing air from said evaporator coil (18) to said condenser coil (14); a third segment (38) discharging air from said condenser coil (14) [A94 col. 3 l. 4-11; A86 fig. 8]; *said first (34), second (36) and third (38) segments of said air flow path (32) being in series from upstream to downstream, respectively* [A86 fig. 8]; an impeller (80) in said cabinet (30) downstream of said condenser coil (14) and drawing air through said cabinet (30) from upstream to downstream, namely through said first (34), second (36) and third (38) segments of said air flow path (32), respectively [A94 col. 4 l. 36-40]; wherein said air flow path (32) comprises a fourth segment (62) (A86 fig. 8) passing ambient air to said condenser coil (14) [A94 col. 3 l. 1-2]; *said fourth segment (62) of said air flow path (32) is in parallel with said second segment (36) of said air flow path (32)* [A94 col. 3 l. 2-4]; comprising a heat exchanger (26) having first (26a) and second (26b) heat exchange paths therethrough in heat exchange relation [A94 col. 3 l. 4-8], and wherein: said first segment (34) of said air flow path (32) has first (34a) and second (34b) subsegments [A94 col. 3 l. 18-19]; said first subsegment (34a) supplies ambient air to said first heat exchange path (26a) of said heat exchanger (26) [A94 col. 3 l. 4-6]; said second subsegment (34b) supplies air from said first heat exchange path (26a) of said heat exchanger (26) to said evaporator coil (18) [A94 col. 3 l. 6-8]; said second segment (36) of said air flow path (32) has third (36a) and fourth (36b) subsegments [A94 col. 3 l. 8-14]; said third subsegment (36a) supplies air from said evaporator coil (18) to said second heat exchange path (26b) of said heat exchanger (26) [A94 col. 3 l. 8-11]; said fourth subsegment (36b) supplies air from said second heat exchange path (26b) of said heat exchanger (26) to said condenser coil (14) [A94 col. 3 l. 11-13]; *wherein said fourth segment (62) of said air flow path (32) is in parallel with each of*

said first (34a) and fourth (36b) subsegments of said air flow path (32) [A94 col. 3 l. 17-19] (emphasis added).

Independent claim 25 defines:

26. A dehumidifier (10) comprising: a cabinet (30) [A94 col. 3 l. 19; A86 fig. 8]; a compressor (12) [A86 fig. 8] in said cabinet (30) for delivering hot compressed refrigerant; a condenser coil (14) [A86 fig. 8] in said cabinet (30) and receiving refrigerant from said compressor (12) and condensing same; an expansion device (16) [A86 fig. 8] in said cabinet (30) and receiving refrigerant from said condenser coil (14) and expanding same; an evaporator coil (18) [A94 col. 3 l. 8; A86 fig. 8] in said cabinet (30) and receiving refrigerant from said expansion device (16) and evaporating same, and delivering said refrigerant to said compressor (12); said refrigerant being circulated from said compressor (12) to said condenser coil (14) to said expansion device (16) to said evaporator coil (18) and back to said compressor (12) in a refrigeration cycle [A94 col. 3 l. 1-38]; said cabinet (30) having an air flow path (32) [A86 fig. 8] therethrough comprising: a first segment (34) passing ambient air to said evaporator coil (18); a second segment (36) passing air from said evaporator coil (18) to said condenser coil (14); a third segment (38) discharging air from said condenser coil (14) [A94 col. 3 l. 4-11; A86 fig. 8]; a fourth segment (62) (A86 fig. 8) passing ambient air to said condenser coil (14) [A94 col. 3 l. 1-2]; an impeller (80) in said cabinet (30) downstream of said condenser coil (14) and drawing air through said cabinet (30) from upstream to downstream, namely through said first (34), second (36) and third (38) segments of said air flow path (32), respectively [A94 col. 4 l. 36-41]; wherein *said first (34), second (36) and third (38) segments of said air flow path (32) are in series from upstream to downstream, respectively [A86 fig. 8], and said fourth segment (62) of said air flow path (32) is in parallel with said second segment (36) of said air flow path (32) [A94 col. 3 l. 2-4];* a heat exchanger (26) having first (26a) and second (26b) heat exchange paths therethrough in heat exchange relation [A86 fig. 8], and wherein: said first segment (34) of said air flow path (32) has first (34a) and second (34b) subsegments [A86 fig. 8]; said first subsegment (34a) supplies ambient air to

said first heat exchange path (26a) of said heat exchanger (26) [A94 col. 3 l. 4-6]; said second subsegment (34b) supplies air from said first heat exchange path (26a) of said heat exchanger (26) to said evaporator coil (18) [A94 col. 3 l. 6-8]; said second segment (36) of said air flow path (32) has third (36a) and fourth (36b) subsegments [A94 col. 3 l. 8-14]; said third subsegment (36a) supplies air from said evaporator coil (18) to said second heat exchange path (26b) of said heat exchanger (26) [A94 col. 3 l. 8-11]; said fourth subsegment (36b) supplies air from said second heat exchange path (26b) of said heat exchanger (26) to said condenser coil (14) [A94 col. 3 l. 11-13]; wherein *said fourth segment (62) is perpendicular to said second heat exchange path (26b)* [A86 fig. 8]; wherein said fourth segment (62) of said air flow path (32) merges with said fourth subsegment (36b) of said air flow path (32) downstream of said second heat exchange path (26b) of said heat exchanger (26) [A94 col. 3 l. 14-17]; wherein *said fourth segment (62) of said air flow path (32) is in parallel with each of said first (34a) and fourth (36b) subsegments of said air flow path (32)* [A94 col. 3 l. 17-19]; wherein said impeller (80) rotates about a rotation axis (82) extending along an axial direction (84) [A94 col. 4 l. 46-48]; said third segment (38) of said air flow path (32) extends axially along said axial direction (84) [A94 col. 4 l. 50-51]; said air flow path (32) has a fifth segment (86, 88) discharging air from said impeller (80), said fifth segment (86, 88) extending radially along a radial direction relative to said axial direction (84) [A94 col. 4 l. 54-55]; said cabinet (30) has an air flow outlet provided by an opening (90, 94) in a cabinet sidewall (92) distally oppositely spaced from said impeller (80) along said radial direction [A94 col. 4 l. 55-58]; wherein said cabinet (30) has an inlet (64) receiving ambient air and having first (64a) and second (64b) branches, said first branch (64a) providing said first segment (34) of said airflow path (32), said second branch (64b) providing said fourth segment (62) of said airflow path (32) [A94 col. 3 l. 19-24]; wherein said compressor (12) and said expansion device (16) are in said airflow path (32) [A86 fig. 8] (emphasis added).

Independent claim 26 defines:

26. The dehumidifier according to claim 25 wherein said impeller (80) is a backward incline blade impeller (80).

C. Parallel Flow Relation – Geometrically Parallel Configuration

The USPTO correctly concluded that an ordinary practitioner in the art reading the specification of the '503 patent would consider the parallel flow relation and the geometrically parallel configurations to be applicable to the disclosure, and that either definition is included in the broadest reasonable interpretation of the claims. The Examiner stated in the 12/16/11 RAN:

As the specification does not give an explicit definition of 'in parallel', and an ordinary practitioner in the art would consider either the parallel flow or geometrically parallel to be applicable to the disclosure, either definition is seen to be included in the broadest reasonable interpretation of the claims. If a word in a specification has two accepted definitions in the art, an applicant (or patent owner) will have support for either definition, unless the specification clearly states one of the given definitions. PO has stated examples of parallel that fit geometrically parallel, but nothing in the specification precludes the use of the other accepted definition, that also is readable into the examples given in the specification.

(A73.)

However, the USPTO erred by failing to construe the claim elements "in parallel with" in their proper context as (1) requiring a parallel flow relation between the fourth segment and the second segment of the air flow paths and (2)

requiring a geometrically parallel configuration between the fourth segment and the first and fourth subsegments.

D. O'Brien Declaration: Geometrically Parallel Air Flow Paths

The USPTO stated that it was unclear what benefit, if any, is derived from having the streams travel in a geometrically parallel direction:

It is unclear what benefit, if any is derived from having the streams travel in a parallel direction.

(A72.)

However, the benefit was clearly spelled out in a Second Declaration of Timothy S. O'Brien (A1134-1144), an engineer with Technologies Holdings. Mr. O'Brien explained that the geometrically parallel air flow paths claimed in the '503 patent helped the dehumidification units achieve high efficiency by reducing restrictions or impedance of the air flow paths, thus reducing the amount of energy necessary to draw the large volume of air to be dehumidified and the bypass air through the unit. (A1142.) Mr. O'Brien opined that absent the geometrically parallel air flow paths claimed in the patent, separate air flow paths drawn through both a bypass and a heat exchanger could create a detrimental effect on the overall air flow throughout the cabinet. This situation could create a significant additional burden on the fan and cause greater power consumption:

27. A unique feature of the Therma-Stor dehumidifier systems having the combination of the bypass and heat exchange airflow paths is that the fourth segment (bypass) is

substantially *geometrically parallel* with the first subsegment, the second segment and the fourth subsegment of the heat exchange path. The substantially *geometrically parallel* air flow paths described in the '503 patent help the dehumidification units achieve the high efficiency of pints per kilowatt hour (ppkw) demonstrated in Ex. A by reducing restrictions or impedance of the airflow paths, thus reducing the amount of energy necessary to draw the necessary large volume of air to be dehumidified and the bypass air through the unit. That is, absent design of the substantially *geometrically parallel* air flow paths as claimed in the patent, having separate air flow paths drawn through both the bypass and heat exchanger could have created a detrimental effect on the overall air flow throughout the cabinet, which could have created a significant additional burden on the fan and cause greater power consumption.

28. Overall, this novel combination of claimed features, i.e., a bypass air flow segment in combination with a heat exchanger and the noted *parallel air flow paths*, provides unexpectedly improved properties and properties not present in the prior art, including:

- a. lower condensing temperature increase;
- b. more moisture is removed over a standard dehumidifier under high ambient temperature conditions;
- c. the operating electrical current increase during high-temperature operation is greatly reduced;
- d. more moisture is removed per unit of energy than a standard dehumidifier
- e. less stress on the compressor, evaporator and condenser coils;
- f. increased operation range while still using the same capacity compressor, evaporator and condenser coils;

- g. increased drying capabilities of the air exiting the cabinet; and
- h. reduced size, making the units highly portable for use in diverse environments.

(A1142-1143.) (emphasis in original)

The Second O'Brien Declaration filed on December 30, 2010 concerning the advantages of having the geometrically parallel air flow paths is uncontroverted.

E. Brown Declaration: Failed to Substantially Address Geometrically Parallel Air Flow Paths

The Declaration of Michael Brown, an engineer for Applied Comfort Products, Inc. (ACP) located in Cambridge, Ontario, Canada, and submitted by Abatement on January 31, 2011 (A1204-1209) and July 27, 2011 (A1297-1302), failed to contradict Mr. O'Brien's Declaration concerning the advantages of having geometrically parallel air flow paths. More specifically, Mr. Brown only submitted conclusory statements failing to specifically address the importance of geometrically parallel air flow paths that, as explained by Mr. O'Brien, (1) avoided detrimental effects on the overall air flow throughout the cabinet; (2) provided the advantages of reducing restrictions or impedance of the air flow paths; and (3) reduced the amount of energy necessary to draw the necessary large volume of air to be humidified in the bypass air through the unit. Mr. Brown only passingly

addressed paragraph 27 of Mr. O'Brien's Declaration when he made the following conclusory statement:

16) In paragraph 27 of his declaration, Mr. O'Brien also claims that the specific airflow paths now claimed result in improved dehumidification efficiency. Respectfully, I disagree. Mr. O'Brien has provided no compelling reason that would cause the claimed airflow to reduce burden on the fan and/or decrease power consumption of any significance. Further, there is nothing "unique" about the claimed airflow paths. In fact, in the Therma-Stor illustrations of the patents under reexamination, there appears to be a fairly restricted air flow path for air entry into the condenser, relative to the size of the blended bypass/condenser air channel located immediately above. These same airpaths are essentially the airflow paths used in both the Orion device and in the device described as prior art by the patent itself and would have been an obvious result of adding a bypass to those systems.

(A1208.)

Despite Mr. Brown's inability to rebut Mr. O'Brien's analysis concerning the advantages of the claimed geometric airflows, Mr. O'Brien's Declaration in this regard was improperly given absolutely no weight by the USPTO.

F. Suppression of Mr. Brown's Patent Application Claiming a Bypass Air Flow in a Humidifier

Mr. Brown's January 18, 2011 conclusory declaration (A1204-1209; A1297-1302) suppressed Mr. Brown's conflicting interest as set forth in his United States Patent Application Serial No. 12/371,135 filed on February 3, 2009 entitled

"Frosting Dehumidifier With Enhance Defrost," *see* U.S. 2009/0205354 A1 published on August 20, 2009. (A1607-1625.)

Brown's application discloses in Fig. 8 (A1613) a fourth airflow bypass segment (flowing through bypass passageway (64)) that bypasses the evaporator (42) and the air-to-air heat exchanger (56) to flow directly to the condenser (54). The fourth bypass segment (vertical) in Brown is geometrically parallel to a first subsegment (vertical) of the airflow (76) and a fourth subsegment (vertical) of the air flow (77).

In the specification, Mr. Brown noted the advantage of using a bypass (29), (64) (A1608, A1613) in order to obtain a blended air temperature to achieve an "optimum design" evaporator performance by reducing the amount of air flowing through the evaporator (12), (42) and cause a net increase in the total blended air flowing through the condenser (13), (54) because the total system pressure that the fan (16), (53) must work against will be reduced. Mr. Brown stated in the specification:

By using bypass holes (29) and introducing some conditioned space air downstream of the evaporator (12), the blended air temperature entering the condenser (13) is still well below the conditioned space air temperature. This is beneficial when one wants to fine tune the amount of air aspirated by the evaporator (12) to achieve an optimum design evaporator performance at a specific set of conditions. Increasing the bypass openings (29) will reduce the amount of air flowing through the evaporator (12), and cause a small net increase in total blended air flowing through the condenser (13), because the total system pressure

that fan (16) must work against will be reduced. The additional air over the condenser (13) does not tend to increase condenser capacity much because the blended air temperature of the bypass air and the evaporator leaving air, as it enters the condenser (13), is higher than if the bypass openings (29) were closed. This approach allows some degree of control to set the evaporator air volume, and to tweak a bit more condenser capacity, by taking advantage of the fan (16) being able to operate against a lower overall system resistance.

(A1619 ¶ 0031; *see also* A1621 ¶ 46.)

Mr. Brown submitted dependent claims specifically directed to the bypass passageway allowing a preselected portion of the incoming air to bypass the evaporator (42) and join the air passageway upstream of the condenser (54).

(A1613.) Dependent claim 19 in Brown's '354 application states:

19. The dehumidifier apparatus defined in claim 17, wherein the air inlet has bypass holes configured to allow a pre-selected portion of the incoming air to enter a bypass passageway that bypasses the evaporator and joins the air passageway upstream of the condenser.

(A1625.)

Abatement failed to disclose that independent claim 17 concerning the dehumidifier with a defrosting cycle was rejected by the USPTO based on prior art, while the dependent bypass claim 19 directed to the bypass was allowed, indicating that patentability was based upon Mr. Brown's bypass. In other words, Mr. Brown claimed that his purported invention included a dehumidifier with a

bypass. Yet, Mr. Brown and Abatement failed to disclose to the USPTO the existence of Technologies Holdings' '503 patent disclosing and claiming a bypass.

Accordingly, Abatement and Mr. Brown failed to meet their duty of disclosure in this case, as well as in Mr. Brown's U.S. patent application. (A1899.) As such, Mr. Brown's Declaration should have been given little, if any, probative weight.

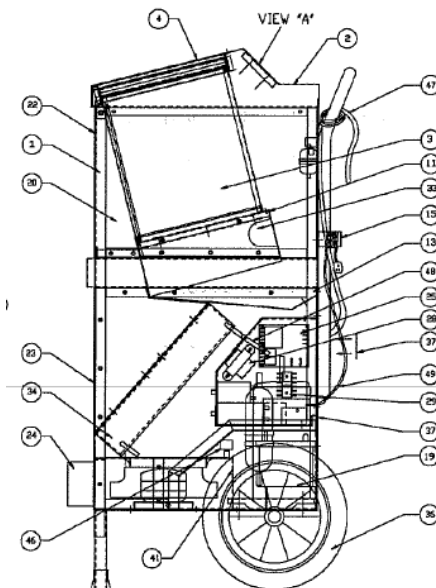
G. Harris U.S. 2,682,758 Is Not Applicable to Claim 12

U.S. Patent No. 2,682,758 to Harris (hereafter "the Harris '758 patent"; A1211-1215) is not applicable to claim 12 in this reexamination. The Harris '758 patent was belatedly introduced into this reexamination on January 18, 2011 as part of the Declaration of Michael Brown. (A1206 ¶ 9.) Abatement failed to submit any Declaration or Affidavit as to when Abatement and/or Mr. Brown first became aware of the Harris '758 patent, as well as to how the Harris '758 patent came to the attention of Abatement and/or Mr. Brown. Abatement's arguments of counsel simply noted in footnotes 1 and 2 of Abatement's January 31, 2011 Response (A1162-1164) that Abatement was not aware of the Harris '758 patent prior to January 13, 2011. The December 16, 2011 Right of Appeal Notice (RAN) held that "Harris will not be used in rejections of claim 12". (A27-29, 36, 60.)

H. Abatement Misrepresented the Orion Reference

In an attempt to establish all limitations of each and every claim element of the '503 patent, Abatement manipulated the Orion reference (A449-450) and misrepresented its functionality.

The Orion two-page publication (A449-450) discloses cut-away depictions of a low temperature dehumidifier. The depiction in the Orion publication does not contain any air flow arrows.



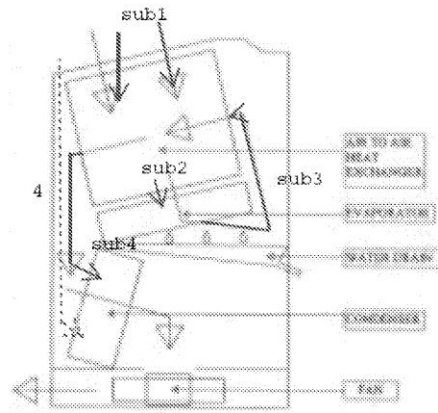
(A450.)

Abatement's Petition erroneously stated:

As to claim 12, which depends from claim 10, placement of the fourth segment as described as obvious above would result in the fourth segment being parallel with the first and fourth segment.

(A188.)

The depiction accompanying Abatement's erroneous statement placed a number of air flow arrows, some of which are designated "sub1," "sub2," "sub 3," "sub 4" and "4".



(A188.)

Such air flow arrows are inaccurate and misleading. For example, the modified Orion depictions show an air flow path entering the heat exchanger (i.e., *sub 1*) that is geometrically parallel to Abatement's (fictional) depiction of a bypass air flow (4). Abatement misleadingly altered the configuration of the interval components of the unit and of the geometric orientation of the air flow path entering the heat exchanger of Orion to make it appear geometrically parallel with its depiction of a non-existent bypass air flow. (A188.)

The arrows added to the Orion reference by Abatement were not verified in any declaration or affidavit, and appear to have been added by Abatement's counsel in this case. Thus, there is no verified evidence that one skilled in the art would

conclude that the air flow paths shown in Abatement's depictions would follow the directions indicated by the attorney's inserted arrows.

Further, Abatement modified the structure of the Orion depiction to provide an external opening between the upper left corner of the heat exchange assembly (3) and the chassis (1). (A188.) In the actual Orion depiction, there is not available space to include a bypass air passageway flowing from the air inlet to the condenser. Here again, the modified depiction (A188) appears to be the work of Abatement's lawyers. Abatement simply ignored the actual construction of the Orion reference in its zeal to include a bypass passageway flowing from the air inlet to the condenser.²

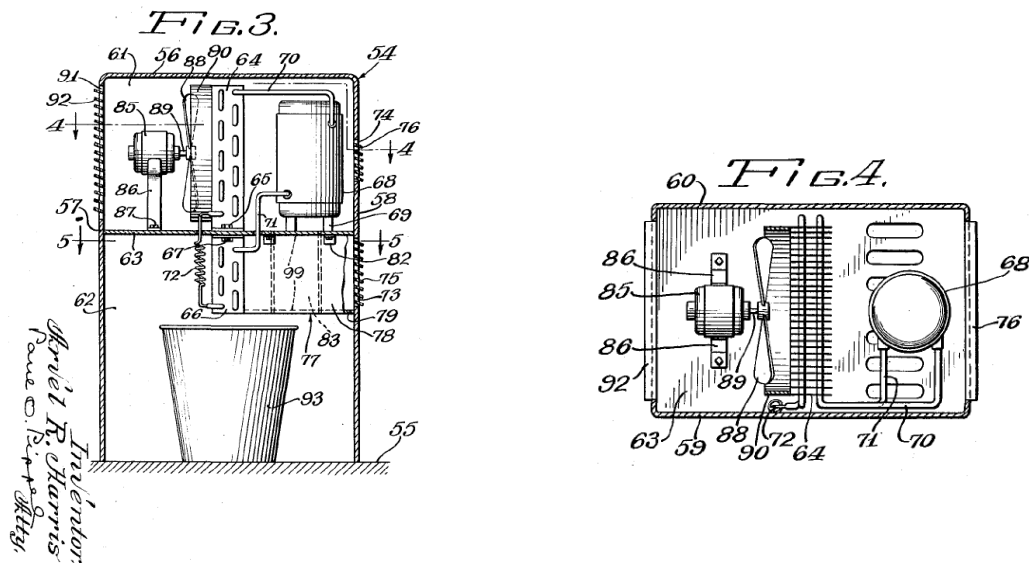
The Orion reference fails to recognize the problems associated with attempting to provide effective high-temperature and low-temperature dehumidification by means of a dehumidifier utilizing a heat exchanger. Orion specifically discloses an "Operating Range" of only "33°F - 105°F," well below the upper high-temperature range provided by the claimed solution. (A449-450.) Moreover, testing revealed that a dehumidifier like Orion having a heat exchanger but no bypass, was not effective in the high-temperature ranges above 90°F. (A1134-1144.)

² The Orion reference also fails to disclose either a compressor or an expansion device in the cabinet (A450), as required by the claims on appeal.

I. Abatement Misrepresented the Harris Patent

The USPTO ignored the placement and functioning of the motor-compressor unit (88) in Harris U.S. 2,682,758 ("the '758 patent").

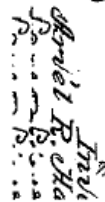
As illustrated in Figs. 3 and 4 of Harris '758 (A1212), the motor-compressor unit (68) is located between an opening (74) and a condenser (64), and between the ducts (83) and the condenser (64). Accordingly, the air is made to flow "around the motor-compressor unit (68)".³ (A1215 col. 5 l. 6-7.)



(A1212.)

As with the Orion reference, Abatement's attorneys added air flow arrows that are inaccurate and misleading.

³ Heat from the compressor (68) will preheat the air entering the condenser (64) to retard the effectiveness of the condenser (64) when the compressor case is hotter than the condenser (64). If the compressor (68) has a cold case, water will condense and drop into the base (63) of the upper cabinet (61), rather than into the receptacle (93). (11/7/11 O'Brien Decl. (A1435-1439), which was refused entry (A27-29).)



(A1877.)

For example, Abatement erroneously states (A1876) that regardless of which construction of "in parallel with" is adopted, "Harris discloses a fourth air flow segment that is parallel to the first heat exchange path and the first air flow subsegment and the fourth air flow subsegment," with reference to Abatement's manipulated depiction above. (A1877.)

Abatement's inaccurate air flow arrows added by Abatement's attorneys to Fig. 3 of the Harris '758 patent (see above) and the erroneous contentions associated therewith ignore the undisputed fact that the motor-compressor unit (68) in Harris would cause turbulence in the air passing from opening (74) and ducts

(83) to condenser (64). Accordingly, it would be "impossible to say" that such air flow path "would be geometrically parallel."⁴ (A1877.)

J. Secondary References

While the secondary references of Lewis US 4,250,629 (A429-436), Miyoshi JP H09-89297 (A438-447), Adachi JP 2002/188827 (A414-427), and Wetzler DE G8707953.4 (A464-501) patents disclose bypass air passages, none render obvious the specific air flow segments and subsegments disclosed and claimed in the '503 patent, namely first and fourth subsegments of air flow path in geometrical parallel configuration with a fourth segment of the air flow path. Further, Lewis, Miyoshi, Adachi and Wetzler simply do not have a path from a heat exchanger to a condenser coil because they fail to disclose a heat exchanger. (A429-436; A438-447; A414-427; A465-501.)

The first secondary reference, Lewis U.S. 4,250,629 (A429-436) discloses a lumber conditioning kiln with a dehumidifier unit. The lumber kiln dehumidifier includes "a flow passage 38 through the evaporator and bypass passage 40 around the evaporator." (A433 col. 4 l. 4-8). As shown in Fig. 1, Lewis discloses positioning the bypass passage 40 adjacent the evaporator 24. Significantly, the air

⁴ Abatement admitted that because of the turbulence in Harris, it would be impossible to say that the Harris reference would not have air flow paths that would be geometrically parallel to at least a portion of the bypass stream. (A1877.) Conversely, however, because of the turbulence, it is "impossible to say" that the air flow paths would be geometrically parallel.

flow though Lewis' bypass passage 40 when the bypass damper 40a is open is not both geometrically parallel with ambient air (to the extent there is "ambient air" inside the kiln housing) and geometrically parallel to air moving to the condenser 26. (A430.) Indeed, the airflow moving though the bypass damper 40a is *perpendicular* to the air moving to the condenser 26. Further, Lewis fails to disclose a heat exchanger.

The next secondary reference, Myoshi JP H-09-8297 (A438-447), discloses a dehumidifier with a bypass airflow pathway 16 directly adjacent the evaporator 1, and fails to disclose a heat exchanger. (A441 at fig. 1.) There is also no merging of the bypass airflow with the air passing from the evaporator 1 to the condenser 3.

Similarly, Adachi JP 2002-188827 (A414-427) fails to disclose merging bypass airflow thorough port 9 with the air passing from the evaporator 11 to the condenser 12. (A418 at fig. 1.) Adachi also fails to disclose a heat exchanger and positions the bypass port 9 adjacent the evaporator 11.

The final secondary reference, Wetzler DE 87 07 953.4 (A464-501) discloses a dehumidifier with bypass dampers 30 that allow room or fresh air stream 31 to be drawn into a second chamber 28 and mixed with a dehumidified stream. (A472-473.) Wetzler fails to disclose a heat exchanger and fails to disclose bypass airflow 31 geometrically parallel with ambient air entering the housing 15 or geometrically parallel with air moving to the condenser 5. (A501.) In both

respects the airflow through the bypass dampers 30 are perpendicular to the air entering into the housing and the air moving toward the condenser. *Id.*

IV. SUMMARY OF THE ARGUMENT

Claim 12 stands rejected as obvious over a combination of the Orion reference in view of Lewis, Miyoshi, Adachi or Wetzler (Grounds 22-25). The USPTO erred by adopting an erroneous claim construction. When the proper claim construction is applied, none of the combination of references applied demonstrate a fourth air flow segment of the air flow path in geometrically parallel relationship with each of first and fourth air flow subsegments.

The USPTO also erred by holding that evidence (i.e., O'Brien Declaration) concerning unexpected results and advantages of the invention was irrelevant to the obviousness issues. Such holding constitutes an error of law, *Genetics Institute, LLC v. Novartis Vaccines and Diagnostics, Inc.*, 655 F.3d 1291, 1307-1308 (Fed. Cir. 2011) [such evidence is relevant even if obtained after the patent's filing or issue date].

On the other hand, the Brown Declaration, submitted by Abatement and relied upon by the USPTO in rejecting the subject claims, contain conclusory statements that specifically failed to address the importance of geometrically parallel air flow paths, and should have been excluded or, at best, given no weight.

Claims 25 and 26 were also erroneously rejected over Orion in view of the secondary references for the reasons addressed above. Further, claims 25 and 26 were erroneously rejected over the Harris reference because Harris fails to disclose the claimed geometrically parallel segments. Finally, claims 25 and 26 were erroneously rejected over the admitted prior art (APA) from the '503 patent and the secondary references because there is no reason to combine these references to achieve the claimed invention where the fourth segment is geometrically parallel to the fourth subsegment and also merges with the fourth subsegment.

V. ARGUMENT

A. Standard of Review

The Board's factual findings are reviewed for substantial evidence and its legal conclusions *de novo*. *In re Kotzabi*, 217 F.3d 1365, 1369 (Fed. Cir. 2000). Whether a claim would have been obvious under 35 U.S.C. § 103(a) is a legal conclusion based on underlying factual determinations. *Id.* The factual determinations include (1) the scope and content of the prior art; (2) the differences between the claims and the prior art; (3) the level of ordinary skill in the art; and (4) objective evidence of nonobviousness. *Graham v. John Deere Co., of Kansas City*, 383 U.S. 1, 17-18, 86 S. Ct. 684, 15 L. Ed. 2d 545 (1966). "[W]hether there is a reason to combine prior art references is a question of fact." *Kinetic Concepts*,

Inc. v. Smith & Nephew, Inc., 688 F.3d 1342, 1367 (Fed. Cir. 2012), *Rambus Inc. v. Rea*, 2013 U.S. App. LEXIS 19500, **4-5 (Fed. Cir. 2013).

Claim construction by the PTO is a question of law that this Court reviews *de novo*, *In re Baker Hughes Inc.*, 215 F.3d 1297, 1301 (Fed. Cir. 2000). While claims are generally given their broadest possible scope during prosecution, the Board's review of the claims of a patent is similar to that of a district court's review, *In re Rambus Inc.*, 694 F.3d 42, 46 (Fed. Cir. 2012), *Rambus Inc. v. Rea*, 2013 U.S. App. LEXIS 19500, **4-5 (Fed. Cir. 2013). On appeal from the PTO to the Federal Circuit, the court reviews the PTO's decision for correctness, "just as we review claim construction by a district court." *In re Baker Hughes Inc.*, 215 F.3d 1297, 1301 (Fed. Cir. 2000).

B. The Board Erred in Claim Construction of the Terms "In Parallel With"

The Board erred by construing the limitation "in parallel with" appearing in claims 12, 25 and 26 as meaning either "parallel flow" or "geometrically parallel". (A1954-1955.) The Board's improper claim interpretation resulted in error in the Board's obviousness determination, *In re Donaldson Co.*, 16 F.3d 1189, 1192 (Fed. Cir. 1994). [On reexamination, "the PTO erred in its construction [of the claims] and this error consequently led the PTO to impose an improper obviousness rejection.]

The protocol of giving claims their broadest reasonable interpretation during reexamination does not include giving claims a legally incorrect interpretation⁵.

The claim terms "in parallel with" as set forth in claims 12, 25 and 26 require two meanings based upon the surrounding context within the claims, namely a "parallel flow" relation and a "geometrically parallel" configuration⁶, *Aventis Pharmaceuticals, Inc. v. Amino Chemicals Ltd.*, 715 F.3d 1363, 1374 (Fed. Cir. 2013). A patentee's mere use of a term with an antecedent does not require that both uses of the term have the same meaning, *Microprocessor Enhancement Corporation v. Texas Instruments, Inc.*, 520 F.3d 1367, 1375 (Fed. Cir. 2008).

The first use of the claim terms "in parallel with" when properly construed in context is different than the meaning for the second use of the terms "in parallel with" when construed in context. In other words, claims 12, 25 and 26 each have two different meanings for the phrase "in parallel with", both of which are required elements of each of the claims.

⁵ "Validity analysis is a two-step procedure: 'The first step involves the proper interpretation of the claims. The second step involves determining whether the limitations of the claims as properly interpreted are met by the prior art,'" quoting *Beachcombers, Int'l, Inc. v. WildeWood Creative Prods., Inc.*, 31 F.3d 1154, 1160 (Fed. Cir. 1994). Whether the PTO used a "broadest reasonable interpretation" in examining the application is irrelevant," *Flo Health Solutions, LLC v. Kappos*, 697 F.3d 1367, 1383 (Fed. Cir. 2012). [Additional views of Judge Newman].

⁶ The Board found that: (1) an ordinary practitioner in the art reading the '503 patent specification would consider both the parallel flow relation and the geometrically parallel configurations to be applicable to the disclosure, and (2) either definition is included in the broadest, reasonable interpretation of the claims. (A73.)

A "parallel flow" relation is required by the following limitations set forth in claims 12 and 25:

said fourth segment (62) of said air flow path (32) is in parallel with said second segment (36) of said air flow path (32)

A "geometrically parallel" configuration is required by the following limitations in claims 12 and 25:

said fourth segment (62) of said air flow path (32) is in parallel with each of said first (34a) and fourth (36b) subsegments of said air flow path (32)

The Board overlooked the significance that the second segment (36) of the air flow path (32) includes both the third (36a) and fourth (36b) subsegments. As such, the Board's error results in the rendering of the second recitation of "in parallel with" in claims 12, 25 and 26 totally superfluous

Specifically, the first recitation of "in parallel with" in claims 12 and 25 require that the second segment (36) passing air from the evaporator coil (18) to the condenser coil (14) is in a parallel flow relationship with the fourth segment (62). Accordingly, the first recitation of "in parallel with" in claims 12 and 25 would necessarily require a "parallel flow" relationship between the fourth subsegment (36b), which is part of the second segment (36), and the fourth segment (62).

On the other hand, the second recitation of the claim terms "in parallel with" appearing in claims 12 and 25-26 require a "geometrically parallel" configuration between the fourth subsegment (36b) and the fourth segment (62).

Accordingly, under the erroneous claim interpretation of the Board, it would be completely redundant for claims 12, 25 and 26 to additionally specify that the fourth segment (62) is "in parallel with" each of the first (34a) and fourth (36b) subsegments. (A94 col. 3 l. 17-19.) Such erroneous claim interpretation would render the second recitation of the terms (A94 col. 3 l. 17-19) utterly superfluous and, therefore, meaningless unless they are construed to mean "geometrically parallel."

The Board also erred by limiting the fourth subsegment (36b) to the exact configuration in the '503 patent drawings. The drawings depict the fourth subsegment (36b) having a first portion perpendicular to the fourth segment (62), a second portion at an angle to the fourth segment (62), and a third portion geometrically parallel to the fourth segment (62). The Board stated:

Hence, the use of the language "in parallel with" within the specification of the '503 patent is not entirely consistent with "geometrically parallel" meaning advocated by the Patent Owner because the fourth subsegment includes substantial portions that are clearly not geometrically parallel.

(A1955.)

As admitted by the Board, the third portion of the fourth subsegment (36b) is "geometrically parallel to the fourth segment" (62). The Board limited the fourth subsegment (36b) to precisely that shown in the preferred embodiment, thereby including the perpendicular and angled portions as limitations in claims 12, 25 and 26. The Board has erred by improperly reading limitations from the specification (including drawings) into the claims.

Third, the Board compounded its error by failing to fully appreciate that claim 25 also requires the fourth segment (62) to be "perpendicular" to the second heat exchange path (26b) as well as being in geometrically parallel configuration with each of the first (34a) and fourth (36b) subsegments of the air flow path (32). Describing other positions of the subsegment as "perpendicular" connotes geometric relationships and indicates that the geometrically parallel interpretation is proper. Such use of the term "perpendicular" in claim 25 provides further evidence of an intent to claim geometric relationships.

Accordingly, the Board's "either/or" holding constitutes error, and results in a "non-sensical reading" of the terms "in parallel with", *Aventis, Id.* at 1374.

C. The Board Erred By Hindsight Reconstructions and Ex Post Reasoning

In setting forth its obviousness combinations for claims 12, 25 and 26, the Board erred in using the '503 patent as a road map, resulting in distortion caused by

hindsight bias and *ex post* reasoning, *KSR International Co. v. Teleflex, Inc.*, 550 U.S. 398, 421, 127 S.Ct. 1727, 167 L. Ed.2d 705 (2007). The Board spewed forth a plethora of alleged obvious modifications that only come from the '503 patent.

The Examiner/Board refused to address the obviousness issue surrounding the claim element that the fourth segment of the air flow path being in geometrically parallel configuration with each of the first and fourth subsegments of the air flow path. Rather than presenting arguments in the alternative, the USPTO steadfastly adhered to its implausible claim construction to maintain its rejection.

Specifically, the Board erred by framing the issue of obviousness as simply adding a bypass. To the contrary, the Board overlooked that claim 12 requires a bypass including a fourth segment in a geometrically parallel configuration with each of the first and fourth subsegments, a configuration that will not exist with combining Orion with Lewis, Miyoshi, Adache and/or Wetzler. The Board summarily dismissed Technologies Holdings' contentions as "premised on an improperly narrow interpretation of the limitation "in parallel with." (A16; A1956.)

Orion, the only primary reference applied to claim 12, and the '503 admitted prior art (APA) applied alternatively to claims 25 and 26, fail to disclose any bypass. The secondary references, namely, Lewis, Miyoshi, Adachi and Wetzler,

do not disclose an obvious modification to Orion or the APA to create a bypass where first and fourth subsegments of the air flow path are geometrically parallel with a fourth subsegment of the air flow path. Only the '503 patent discloses creating a bypass opening remote from the evaporator so that bypass airflow and airflow from the heat exchanger to the evaporator are geometrically parallel. Further, Lewis, Miyoshi, Adachi and Wetzler do not have a path from a heat exchanger to a condenser coil because they fail to disclose a heat exchanger.

Thus, there is no reason to combine any of the secondary reference (Lewis, Myoshi, Adachi or Wetzler) with the primary references to achieve the claimed invention. Neither Lewis or Wetzler when combined with Orion disclose a fourth segment of said air flow path (bypass) in parallel with each of said first (ambient entry) and fourth (second heat exchange to condenser after evaporator) subsegments because both Lewis and Wetzler disclose the bypass *perpendicular* to the air flowing to the condenser. Moreover, neither Lewis or Wetzler disclose a heat exchanger and Wetzler further discloses that the bypass air flow is perpendicular to the ambient air entry.

Further, modifying the primary references to provide the bypass taught by Myoshi or Adachi would position the bypass opening at a location (i.e., on a side portion of the housing) that would necessitate the ambient air entering the housing to be perpendicular to the air moving to the condenser. Indeed, the only way

Abatement or the USPTO can conjure a reason to reconfigure the internal components to provide a bypass where the claimed geometrical relationship would occur is to use *ex post* reasoning from the '503 patent.

Abatement admitted that at least a portion of the air flow through the dehumidifier pictured in the primary Orion reference is by nature turbulent. (A1875.) If Orion provides turbulent air flow, as Technologies Holdings admits, it would be improper to conclude that adding a bypass would result in a geometrically parallel air flow for increasing high efficiency by reducing impedance of the air flow paths. (See A1142 ¶ 27.)

Simply stated, Abatement and the Examiner/Board have failed to establish a *prima facie* case of obviousness and can only do so using impermissible hindsight.⁷

D. The Examiner/Board Erred By Requiring Advantages to be Set Forth in the Patent Claims

Abatement contends (A1875) that since none of the pending claims recite the substantial advantage of "the upper high temperature range provided by the

⁷ "The Board erroneously placed the burden on Rambus to prove that its claims were not obvious. In reexamination proceedings, "a preponderance of the evidence must show nonpatentability before the PTO may reject the claims of a patent application." *Ethicon, Inc. v. Quigg*, 849 F.2d 1422, 1427 (Fed. Cir 1988); *see also In re Jung*, 637 F.3d 1356, 1365-66 (Fed. Cir. 2011) (explaining that while "the applicant must identify to the Board what the examiner did wrong, ...the examiner retains the burden to show invalidity")," *Rambus Inc. v. Rea*, 2013 U.S. App. LEXIS 19500, **14-15 (Fed. Cir. 2013).

claimed solution," Technologies Holdings' arguments are irrelevant. The Board stated: "a temperature range is not recited in the claims as noted by the Examiner." (A15; A1956.) This is error.

Assuming *arguendo* that the Examiner/Board has established a *prima facie* case of obviousness, Technologies Holdings has rebutted any such contention by showing "unexpected results," namely, that the claimed invention exhibits a superior property and advantage that a person of ordinary skill in the relevant art would have found surprising or unexpected. The basic principle behind such rule is straightforward, if it would have been surprising to a person of ordinary skill in a particular art, it would not have been obvious. *In re Soni*, 54 F.3d 746, 750 (Fed. Cir. 1995).

The superiority or advantages of the invention must be considered in determining obviousness, and they need not be contained in the claims, *Preemption Devices, Inc. v. Minnesota Mining & Mfg. Co.*, 732 F.2d 903, 907 (Fed. Cir. 1984) ["As for putting advantages ... in claims, they do not properly belong in claims."]; *Kalman v. Kimberly-Clark Corp.*, 713 F.2d 760, 774 (Fed. Cir. 1983), *cert. denied*, 465 U.S. 1026, 79 L. Ed. 2d 687, 104 S. Ct. 1284, 224 U.S.P.Q. (BNA) 520 (1987) [advantages of invention are to be considered, whether or not claimed"].

See also In re Merchant, 575 F.2d 865, 869 (CCPA 1978): "We are aware of no law requiring that unexpected results relied upon for the patentability be recited in the claims."

Evidence developed after the patent grant is not excluded from consideration, for understanding of the full range of an invention is not always achieved at the time of filing the patent application. It is not improper to obtain additional support consistent with the patented invention to respond to litigation attacks on validity. There is no requirement that an invention's properties and advantages were fully known before the patent application was filed, or that the patent application contain all of the work done in studying the invention, in order for that work to be introduced into evidence in response to litigation attack. Nor is it improper to conduct additional experiments and provide later-obtained data in support of patent validity, *Knoll Pharmaceutical Company, Inc. v. Teva Pharmaceuticals USA, Inc.*, 367 F.3d 1381 (Fed. Cir. 2004):

Evidence of unexpected results includes facts beyond what was known at the time of the invention and includes later-found properties of the invention that would have been unexpected at the time of the invention.

The evidence of unexplained results set forth by Technologies Holdings establishes that the invention claimed in the '503 patent was not obvious.

E. The Examiner/Board Erred By Requiring Technologies Holdings to Construct a Hypothetical Model for Testing

Abatement erroneously contends that Mr. O'Brien (Technologies Holdings' Chief Engineer) was required to build and test hypothetical structures for comparative testing against the invention in claim 12, namely, "having a bypass and a heat exchanger." (A1873.) Abatement erroneously contends that Mr. O'Brien was required to test a "dehumidifier with an air-to-air heat exchange with and without a bypass against a dehumidifier with and without a bypass and no air-to-air heat exchange." (A1874.)

Simply stated, Technologies Holdings is not required to build and make the modifications suggested by the Examiner's/Board's obviousness combination as a prerequisite for evidence of unexpected results. Both direct and indirect comparison tests concerning the closest prior art is sufficient, *In re Merchant*, 575 F.2d 865 868-869 (CCPA 1978); *The Procter & Gamble Company v. Teva Pharmaceuticals, Inc.*, 566 F.3d 989, 997 (Fed. Cir. 2009).

Mr. O'Brien testified that he tested his invention against a dehumidifier described in the prior art, but without the inventive features in the '503 patent. (A1135-1143 ¶¶ 6-28.)

The Examiner/Board, at the urging of Abatement, has failed to give any weight to the comparative data submitted by the Declarations of Mr. O'Brien in

determining whether the claimed invention provides unexpected results. Neither the Examiner/Board nor Abatement contest the fact that the Second O'Brien Declaration filed on December 30, 2010 concerning the advantages of having the geometrically parallel air flow paths was uncontradicted.

Mr. O'Brien's Declaration contains specific data indicating improved properties. It states that the improved properties provided by the claimed invention are much greater than would have been predicted. (A1134-1143.) In any event, the Examiner/Board, at the urging of Abatement, declined to accept Mr. O'Brien's conclusion that the improvements were much greater than would have been predicted.

While mere improvements in properties does not always suffice to show unexpected results, the substantial unexpected improvements as documented by the O'Brien Declaration suffices to establish unexpected results, *In re Soni*, 54 F.3d 746, 751 (Fed. Cir. 1995):

In our view, however, when an applicant demonstrates substantially improved results, as Soni did here, and states that the results were unexpected, this should suffice to establish unexpected results in the absence of evidence to the contrary. Soni, who owed the PTO a duty of candor, made such a showing here. The PTO has not provided any persuasive basis to question Soni's comparative data and assertion that the demonstrated results were unexpected. Thus, we are persuaded that the Board's finding that Soni did not establish unexpected results is clearly erroneous.

Abatement has misled the Examiner/Board by contending that "The closest prior art to the claimed invention was a dehumidifier with a bypass and air flow paths that differed from those now claimed." (A1873.) The Orion reference does not show or suggest the use of a bypass. The references of Lewis, Miyoshi, Adachi and Wetzler do not have a path from a heat exchanger to a condenser coil because they fail to disclose a heat exchanger. These references make no mention of adding any type of bypass to a heat exchanger system. Any attempt to add a heat exchanger to these designs would change the principal operation while requiring severe modification and reconfiguration. Further, the secondary references do not disclose a fourth segment of air flow path in parallel with first and fourth subsegments of the air flow path.

Mr. O'Brien's Declaration made a comparative showing (A1135-1143 ¶¶ 6-28) between his claimed invention and the closest prior art, namely, the Orion reference.⁸ Accordingly, the contention that Mr. O'Brien's test results were flawed because he allegedly failed to modify the primary reference to incorporate a bypass relationship is without merit and such alleged requirement constitutes an error of law.

⁸ Direct comparison with the closest prior art is not required in all cases. Courts have found indirect comparisons persuasive to nonobviousness, *In re Merchant*, 575 F.2d 865, 869 (CCPA 1978).

F. The Examiner/Board Erred By Relying Upon Mr. Brown's Testimony

The Board overlooked the fact that Mr. Brown's Declaration is silent regarding the fact that Applied Comfort Products, Inc. (ACP) is currently being sued in Atlanta, Georgia, for infringement of the '503 patent, *Therma-Stor LLC and Technologies Holdings Corp. v. Abatement Technologies, Inc. and Applied Comfort Products, Inc.*, CA 1:2010cv00035 (N.D. Ga.), transferred from Wisconsin, CA 3:2009cv00229 (E.D. Wis.). Mr. Brown is Vice President of Engineering for ACP and the claimed inventor on ACP's U.S. Patent Application Serial No. 12/371,135.⁹ (A1607-1625.)

The Examiner/Board erred by failing to recognize the financial interest and bias of Mr. Brown with respect to Technologies Holdings' '503 patent.

In attempting a cover-up, Abatement misled the USPTO by contending that "the fact that Mr. Brown included dependent claims reciting a bypass [in its pending U.S. patent application] is irrelevant." (A1871.) The dependent claim 19 in Brown's pending application recites a bypass and is dependent upon claim 17 for a dehumidifier with a defrosting cycle. (A1625.) Abatement failed to disclose that independent claim 17 concerning the dehumidifier with a defrosting cycle was rejected by the USPTO based on prior art, while the dependent bypass claim 19

⁹ The Declaration of Michael Brown failed to contradict Mr. O'Brien's Declaration concerning the advantages of having geometrically parallel air flow paths, and only submitted conclusory statements which failed to specifically address the importance of geometrically parallel air flow paths. (A1297-1302.)

directed to the bypass was allowed, indicating that patentability was based upon Mr. Brown's bypass (*see* A1472; A1899). In other words, Mr. Brown claimed that his purported invention included a dehumidifier with a bypass while failing to disclose to the USPTO the existence of Technologies Holdings' '503 patent disclosing and claiming a bypass with specific parallel configurations.¹⁰

Abatement and Mr. Brown failed to meet their duty of disclosure in this case, as well as in Mr. Brown's patent application currently pending before the USPTO. Accordingly, Mr. Brown's Declaration should have been stricken, or at least given little or no weight.

¹⁰ The general law of evidence has long recognized that the testimony of any witness may be rendered suspect by a past relationship with a party, *Nilssen v. Ostram Sylvania, Inc.*, 504 F.3d 1223, 1229-1230 (Fed. Cir. 2007), cert. denied, 554 U.S. 903, 128 S. Ct. 2938, 171 L. Ed. 2d 865 (2008) [it is material to an examiner's evaluation of the credibility and contents of affidavits to know of any significant relationship between an affiant and an applicant – failure to disclose that relationship violates the duty of disclosure]; *Ferring B.V. v. Barr Laboratories, Inc.*, 437 F.3d 1181, 1187-1190 (Fed. Cir. 2006), cert. denied, 549 U.S. 1015, 127 S. Ct. 515, 166 L. Ed. 2d 404 (2006) [the general law of evidence has long recognized that the testimony of any witness may be rendered suspect by a past relationship with a party – relevant interests are not limited to direct financial interests – one cannot excuse the submission of a misleading affidavit on the ground that it was only cumulative – affidavits are inherently material, even if only cumulative]; *Refac International, Ltd. v. Lotus Development Corporation*, 81 F.3d 1576, 1581-1584 (Fed. Cir. 1996) [the affiant cannot *post facto* hide behind the MPEP guidelines to argue that what they did with a purpose should be disregarded, citing *Molins PLC v. Textron, Inc.*, 48 F.3d 1172, 1182 (Fed. Cir. 1995)], cited with approval in *Therasense, Inc v. Becton, Dickinson and Company*, 649 F.3d 1276, 1292 (Fed. Cir. 2011); *Paragon Podiatry Laboratory, Inc. v. KLM Laboratories, Inc.*, 984 F.2d 1182, 1190-1191 (Fed. Cir. 1993).

G. Abatement's Bad Faith is Further Emphasized By Repeatedly Citing the Harris U.S. 2,682,758 Patent in Abatement's Brief Concerning Claim 12

The Examiner/Board specifically excluded Harris from consideration with respect to claim 12. Abatement failed to cross-appeal the exclusion of Harris, constituting a waiver by Abatement. Yet, Abatement (A1872, 1873, 1875) continually and repeatedly referred to the Harris patent as if it applied to claim 12, even though it clearly does not. In fact, Mr. Brown's conclusory statements in his declaration are based upon the Harris U.S. 2,682,758 patent, which Abatement clearly knows was not before the Examiner/Board with respect to claim 12. For this additional reason, the Examiner/Board erred in relying upon the Brown Declaration.

H. Claims 25 and 26 Are Not Obvious for Additional Reasons

Technologies Holdings' analysis concerning claim 12 is also applicable to claim 25, and need not be repeated for sake of brevity.

Abatement erroneously contended that the Harris reference discloses a fourth air flow segment that is geometrically parallel with the first and fourth air flow subsegments. (A1876-1879.)

Abatement stated that at least a portion of the air flow through the dehumidifier pictured in the Harris reference is by nature turbulent. (A1877.) If

Harris provides turbulent air flow, as Abatement contends, it would be improper to say that Harris provides a fourth section providing a geometrically parallel air flow for increasing high efficiency by reducing impedance of the air flow paths. (*See* A1142 ¶ 27.) Thus, Abatement tacitly admits that the air flow arrows that it added such as Nos. 2 and 4, on Fig. 3 of the Harris reference, are inaccurate and fail to illustrate the turbulent air flow that must pass about and around a substantially large motor compressor unit (68).

In like manner, the air flow arrows that Abatement added to the Orion reference fail to illustrate the admitted turbulence. Thus, Abatement admits to misrepresenting the air flow patterns in both the Harris and Orion references. Further, there is no reason to combine any of the secondary reference (Lewis, Myoshi, Adachi or Wetzler) with the Orion reference to achieve the claimed invention of claim 25 for the reasons a set forth above.

Additionally, claim 25 requires that the fourth segment of said air flow path merge with the fourth subsegment of said air flow path downstream of the second heat exchange path of said heat exchanger. Both Myoshi and Adachi teach away from this type of merger because the bypass path is arranged to *avoid* the air moving from the evaporator to the condenser. Indeed, Adachi discloses a partition board 2e to ensure separation between the bypass air and the air moving from the evaporator 11 to the condenser. (A416 ¶ 15; A418 at fig. 1.) Myoshi similarly

unexpected results, neither the Abatement nor the Examiner/Board have indicated any awareness of any physical embodiment of the dehumidifiers illustrated in the Harris reference. As previously discussed, Technologies Holdings is not required to conduct tests upon a hypothetical model which does not exist.¹¹

Here again, Abatement utilizes the '503 patent as a road map, resulting in distortion caused by hindsight bias and *ex post* reasoning, as discussed above, whether considering Orion, Harris, or the admitted prior art, either alone or with Adashi, Lewis, Miyoshi and/or Wetzler.

Finally, claim 26 is dependent upon claim 25. As detailed above, the Examiner's/Board's rejection of claim 25 is improper and, therefore, dependent claim 26 should be likewise deemed non-obvious.

VI. CONCLUSION AND RELIEF SOUGHT

The Examiner's/Board's rejection of claims 12, 25 and 26 is based on hindsight bias and *ex post* reasoning caused by the distortions submitted by Abatement and Mr. Brown, as well as erroneous claim interpretation.

With all due respect, the Examiner/Board used Technologies Holdings' patent as a roadmap to engineer hindsight reconstruction in order to reject claims 12, 25 and 26.

¹¹ Technologies Holdings was not aware of the Harris reference when submitting its December 30, 2010 Response, including the Declaration of Mr. O'Brien. The Examiner closed prosecution promptly after Abatement submitted its July 27, 2011 Response discussing the new Harris reference.

Consideration of this appeal and allowance of claims 12, 25 and 26 is earnestly requested.

Respectfully submitted,

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Addendum



US007246503B1

(12) **United States Patent**
O'Brien et al.

(10) **Patent No.:** **US 7,246,503 B1**

(45) **Date of Patent:** **Jul. 24, 2007**

(54) **ENHANCED DRYING DEHUMIDIFIER**

(56) **References Cited**

(75) Inventors: **Timothy S. O'Brien**, Deforest, WI (US); **Steve S. Dingle**, McFarland, WI (US)

(73) Assignee: **Bou-Matic Technologies LLC**, Madison, WI (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 94 days.

(21) Appl. No.: **11/280,054**

(22) Filed: **Nov. 16, 2005**

(51) **Int. Cl.**
F25D 21/00 (2006.01)

(52) **U.S. Cl.** **62/272; 62/92**

(58) **Field of Classification Search** **62/92, 62/185, 272, 292**

See application file for complete search history.

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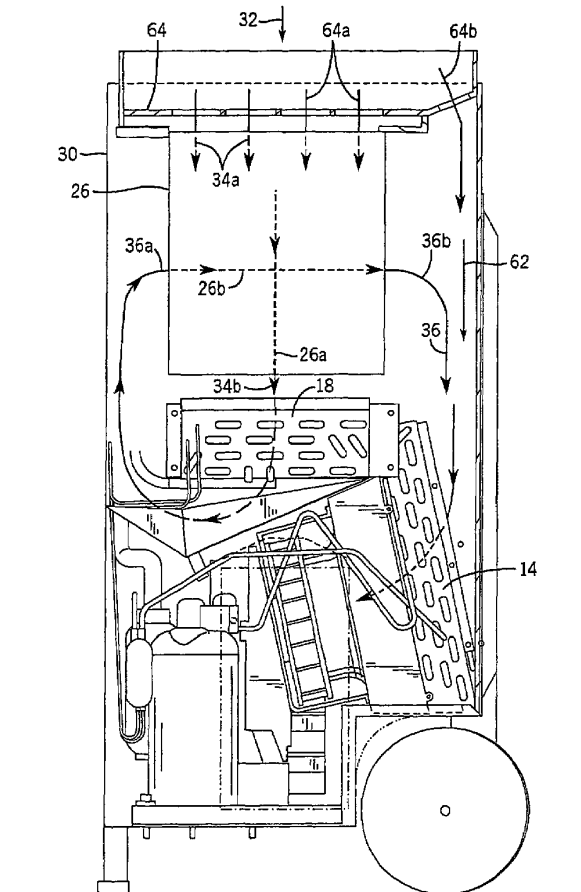
Primary Examiner—Melvin Jones

(74) *Attorney, Agent, or Firm*—Andrus, Scales, Starke & Sawall, LLP

(57) **ABSTRACT**

A dehumidifier includes an impeller in a cabinet downstream of a condenser coil and drawing air through the cabinet from upstream to downstream through first, second and third segments of an air flow path from an evaporator coil to the condenser coil.

24 Claims, 12 Drawing Sheets



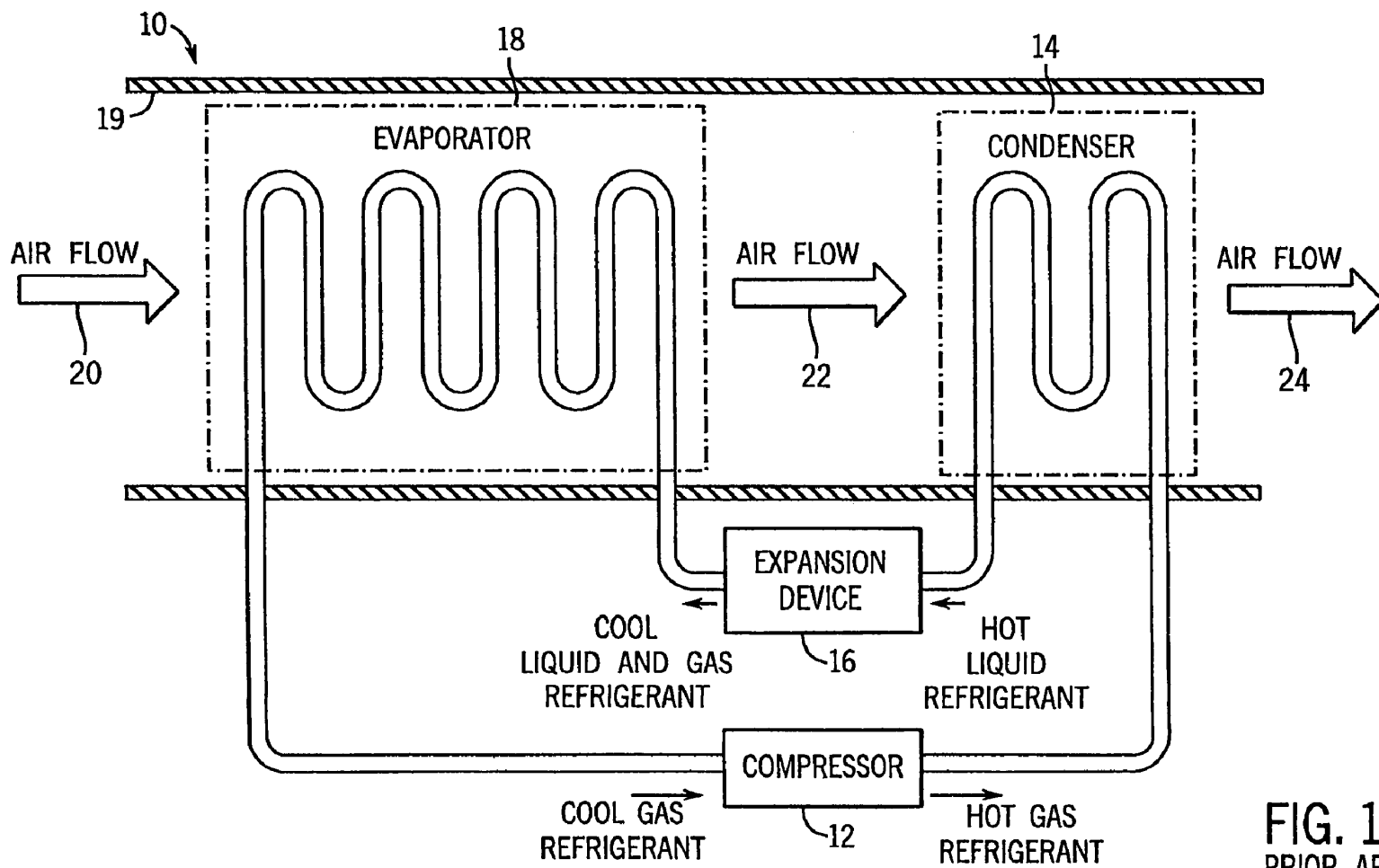


FIG. 1
PRIOR ART

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FIG. 2 PRIOR ART

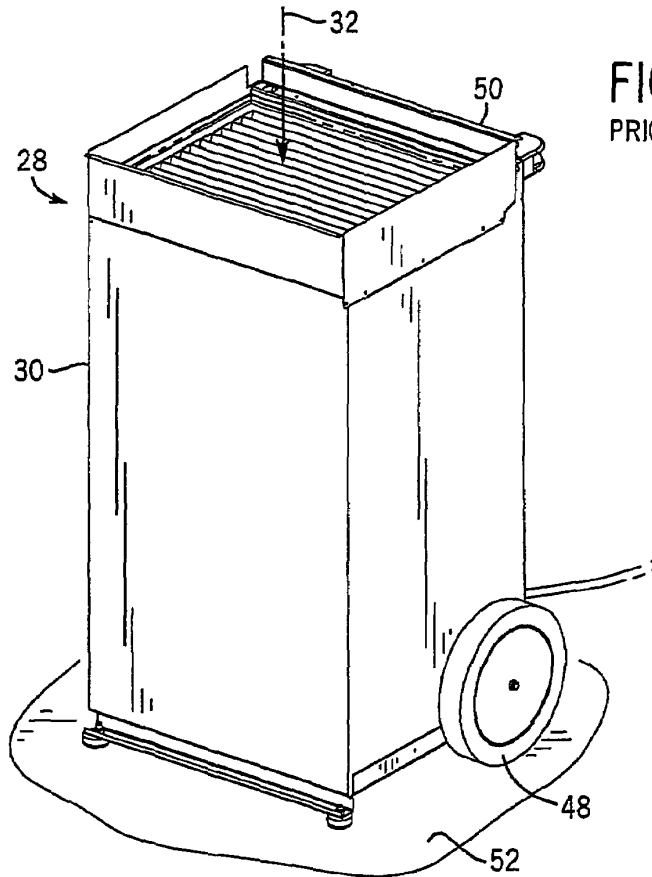
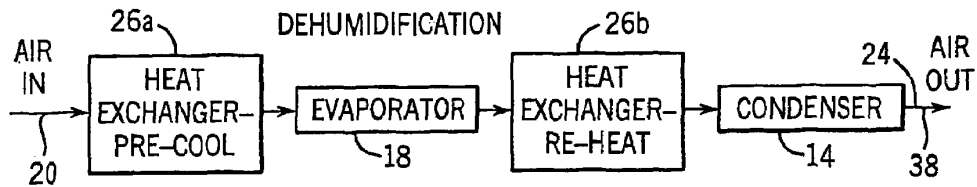


FIG. 3
PRIOR ART

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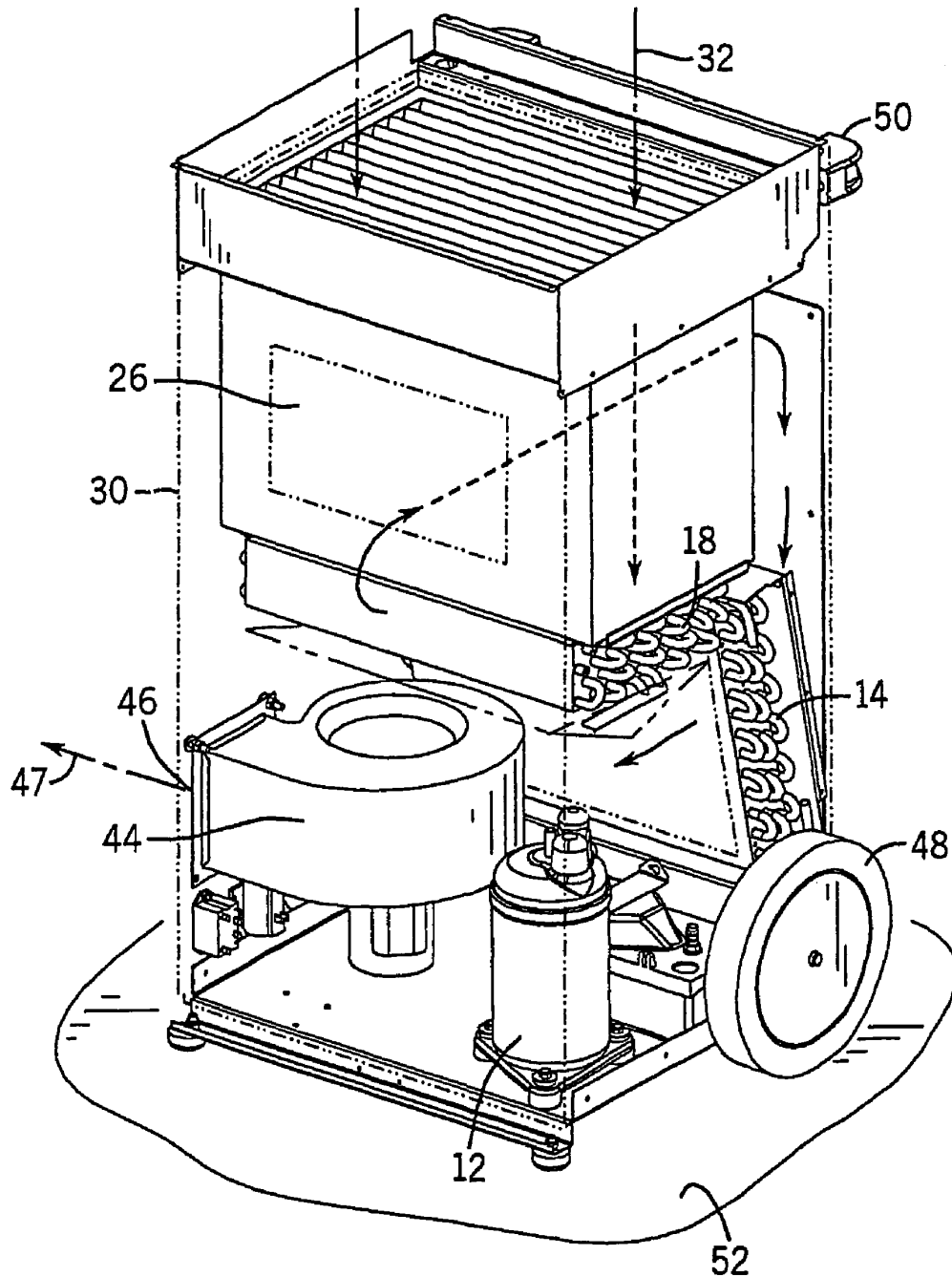


FIG. 4
PRIOR ART

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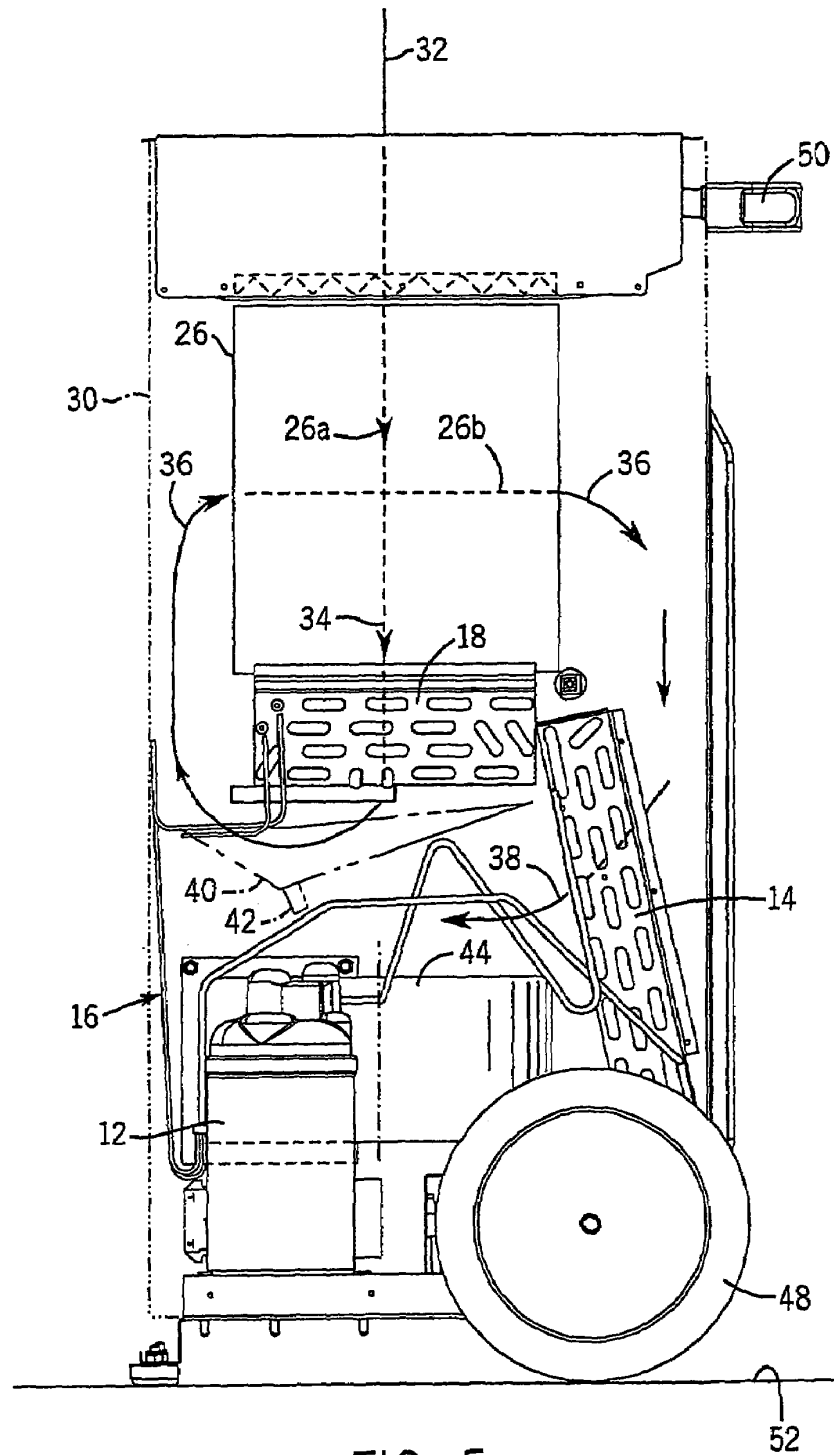


FIG. 5

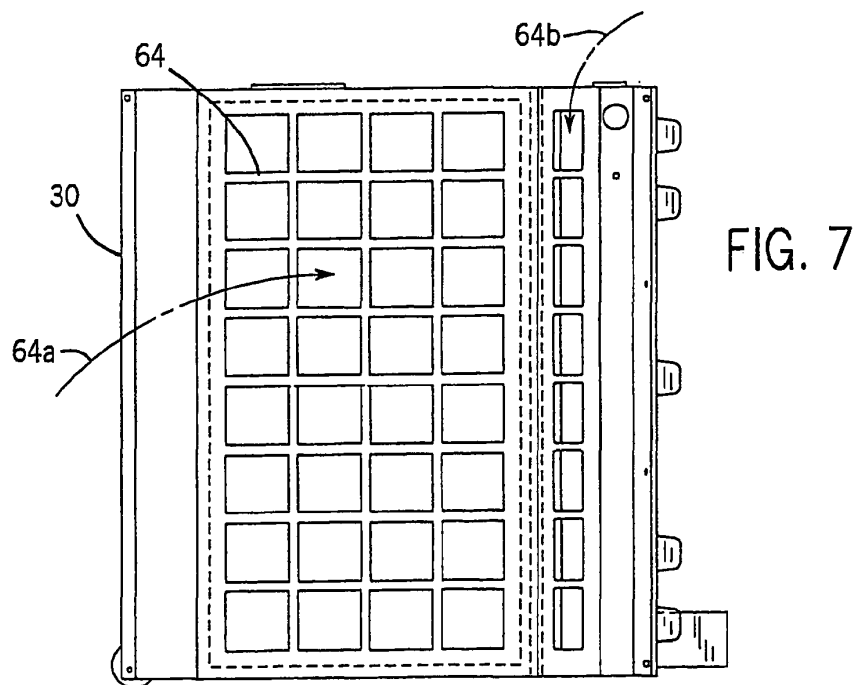
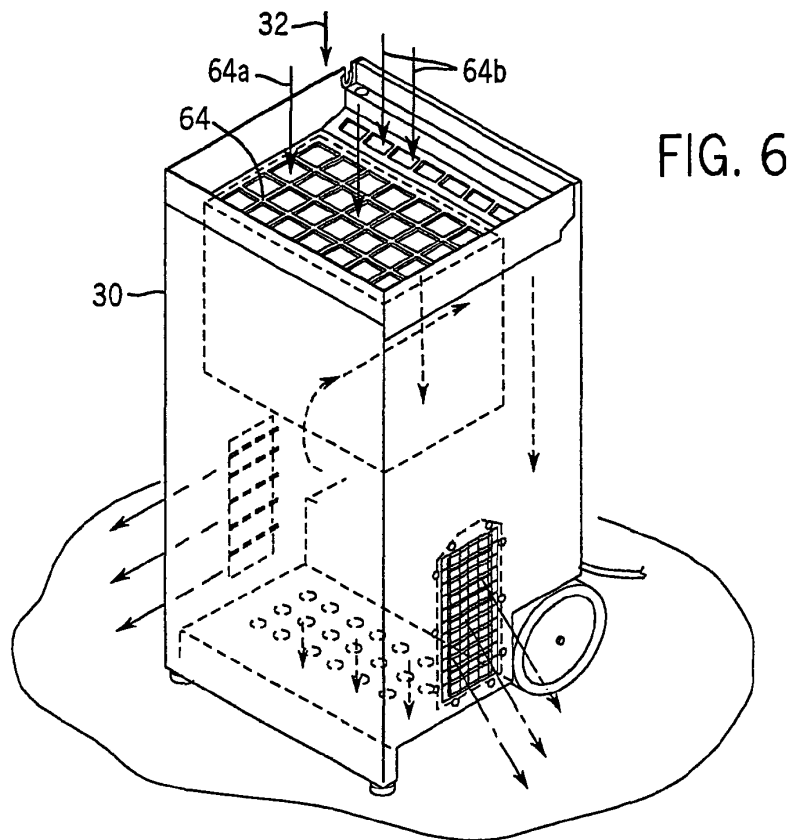
PRIOR ART

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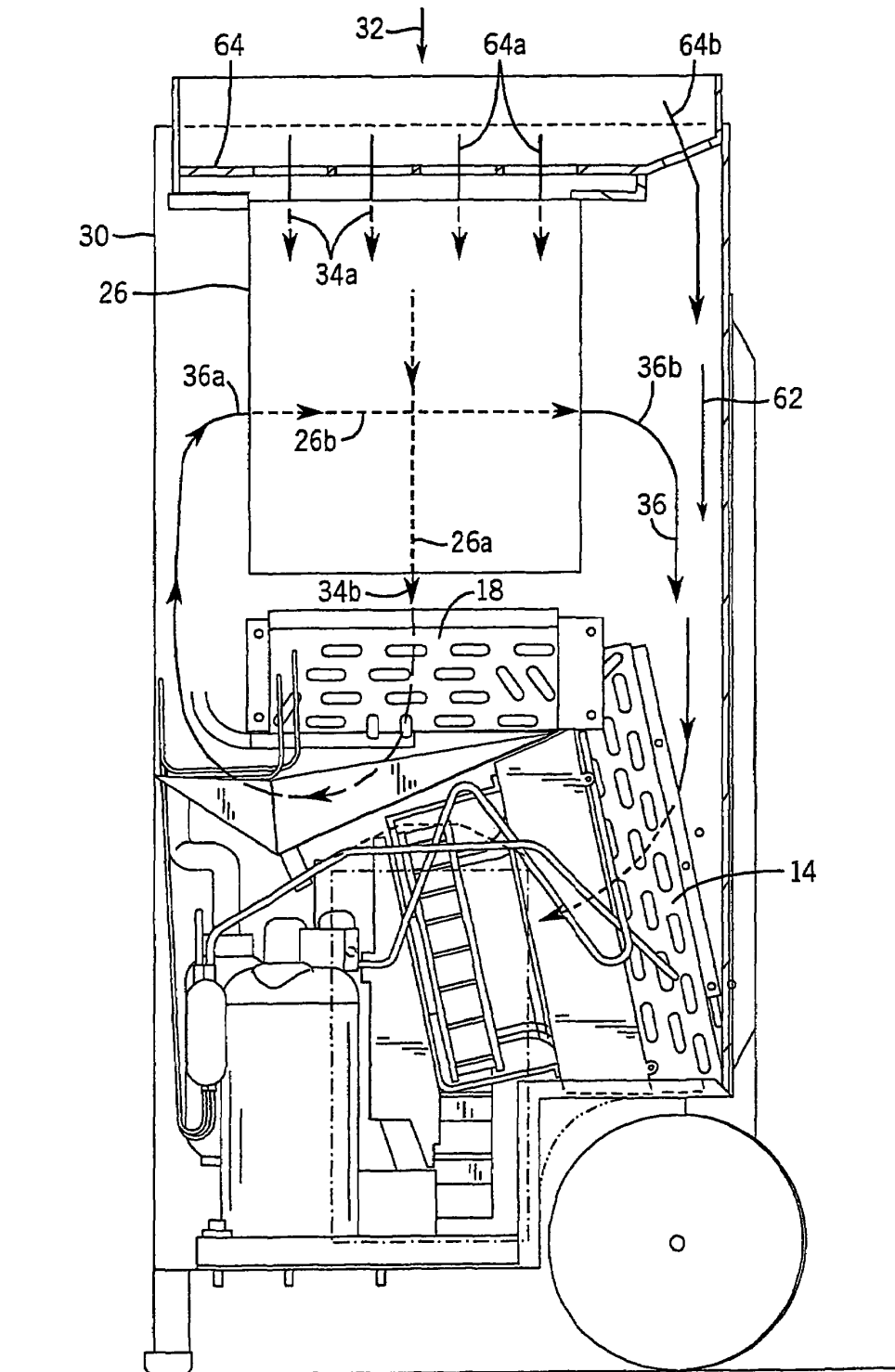


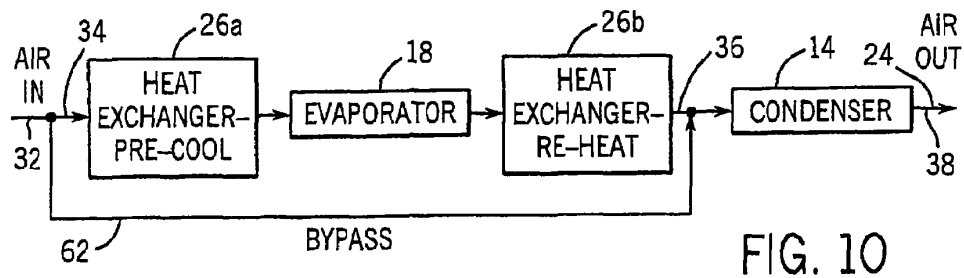
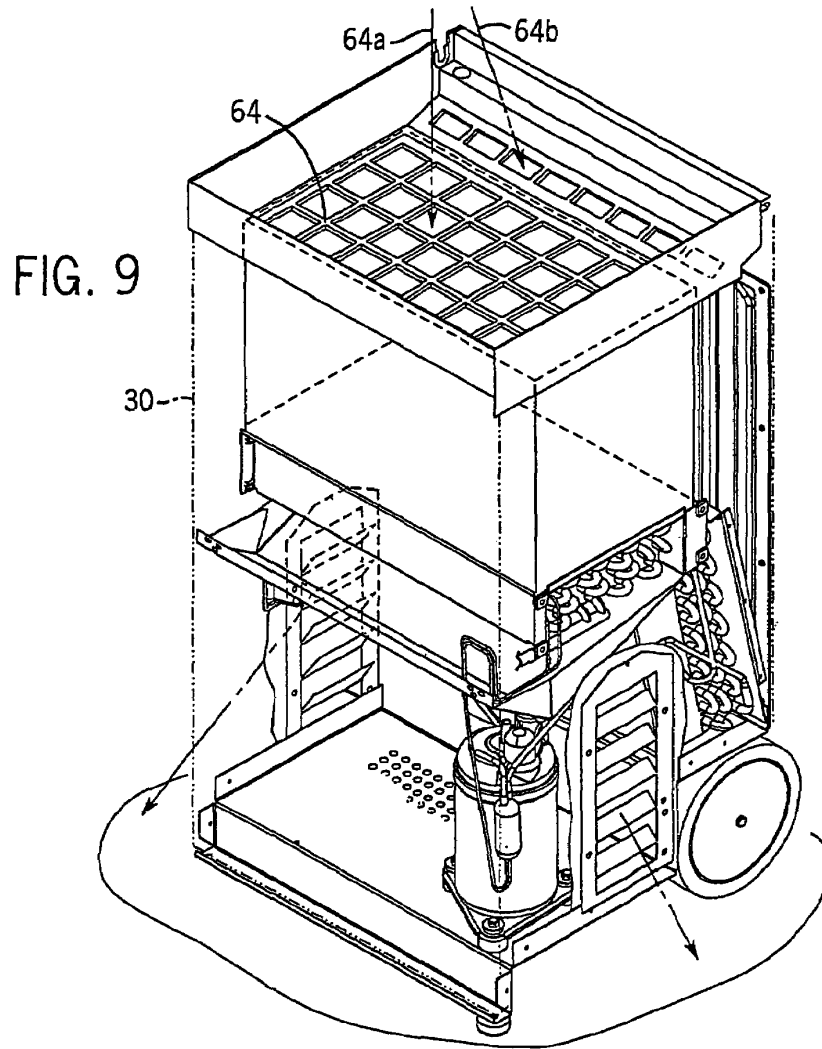
FIG. 8

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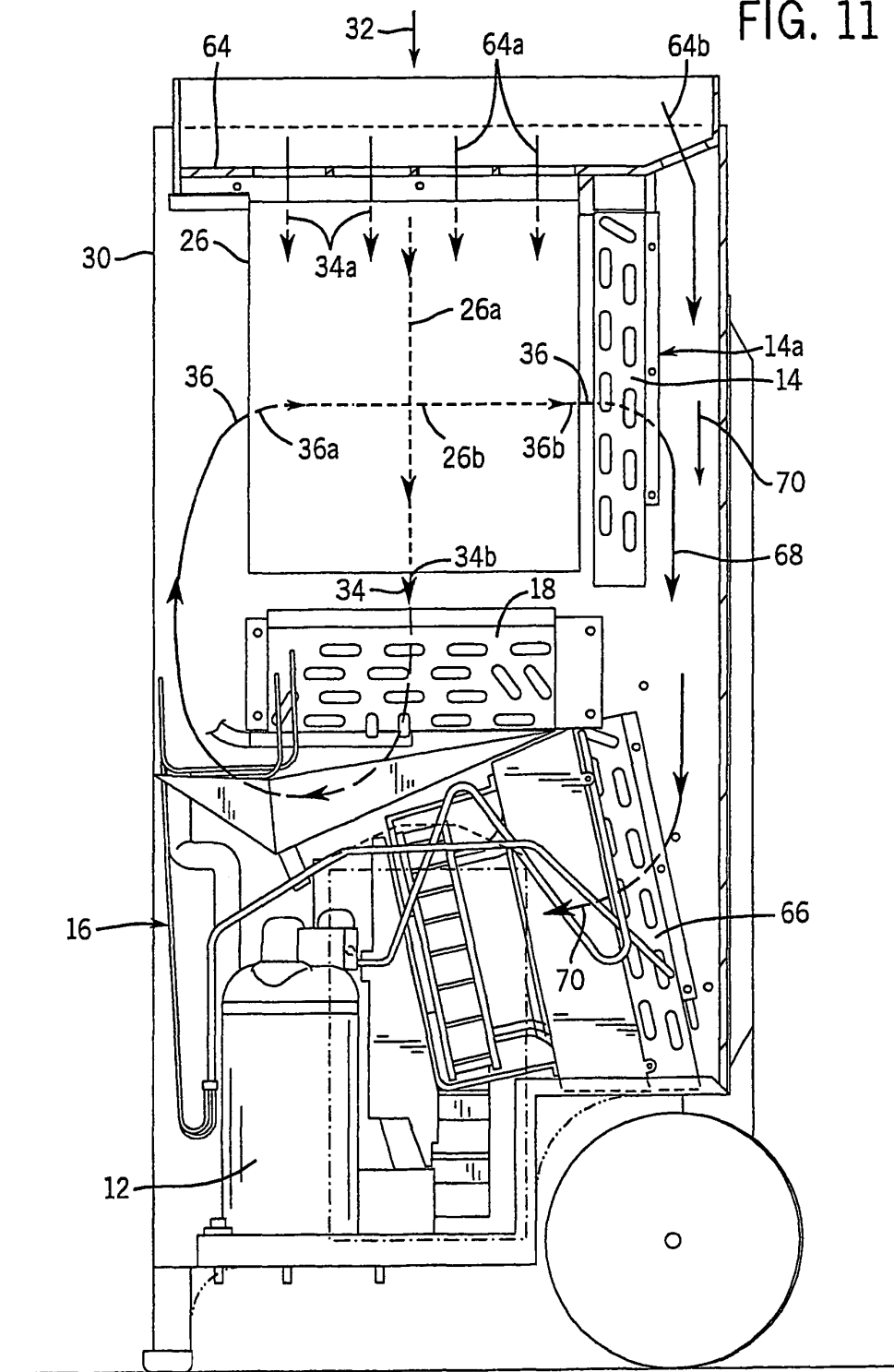
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FIG. 11



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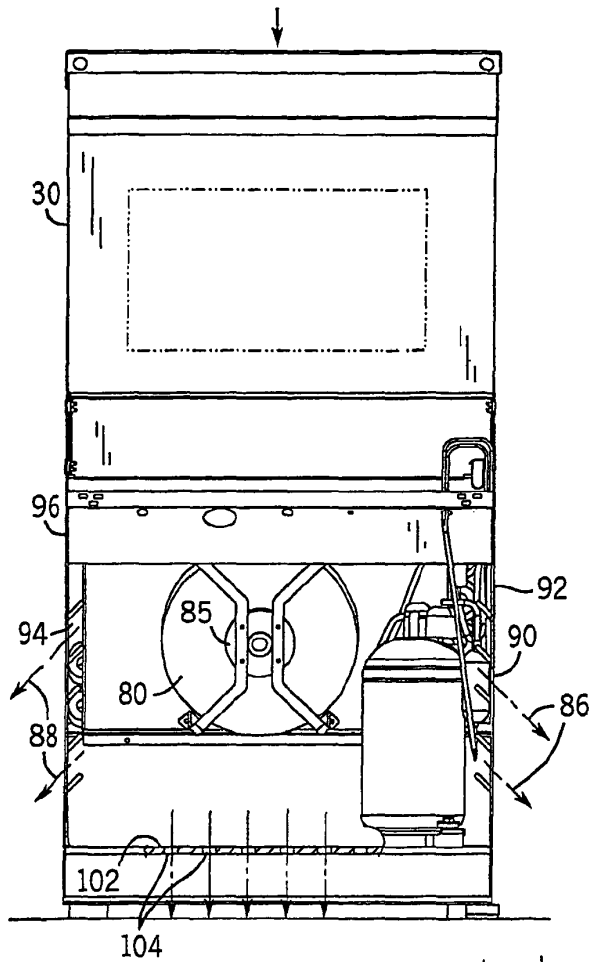


FIG. 12

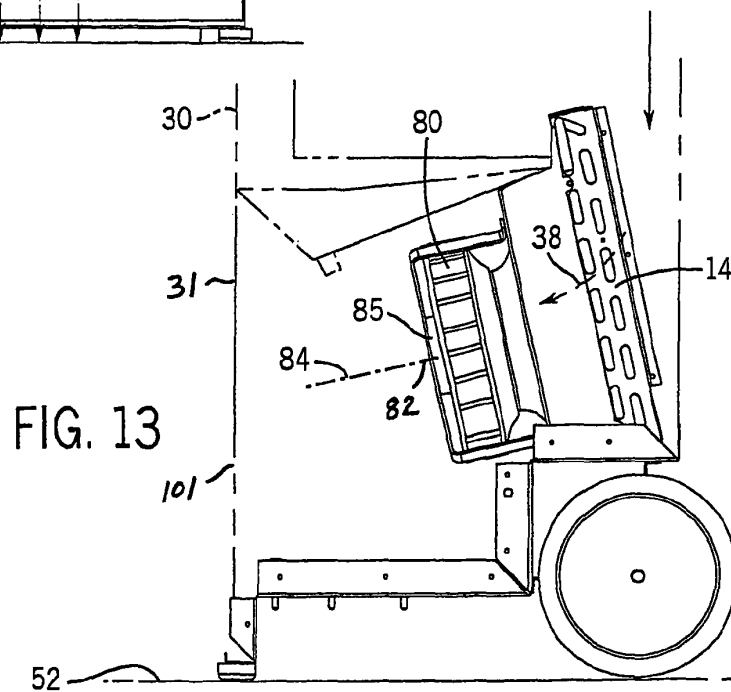


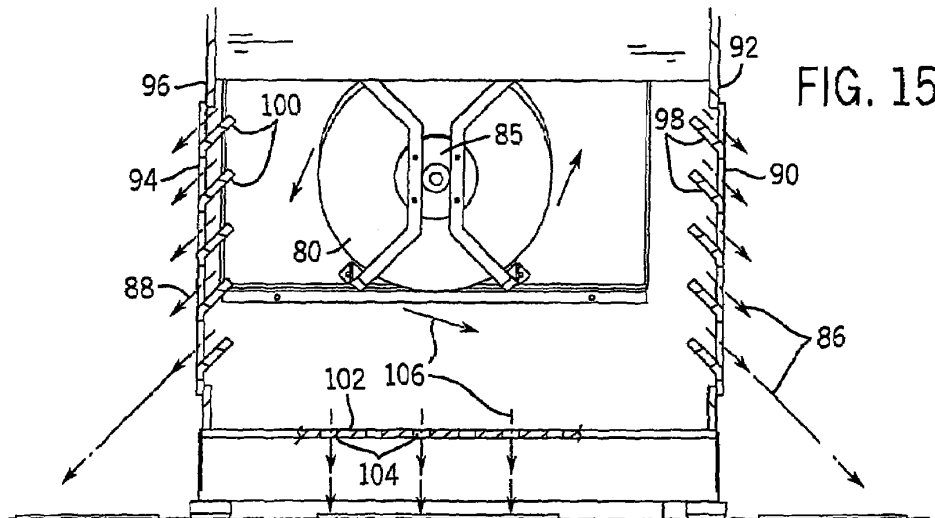
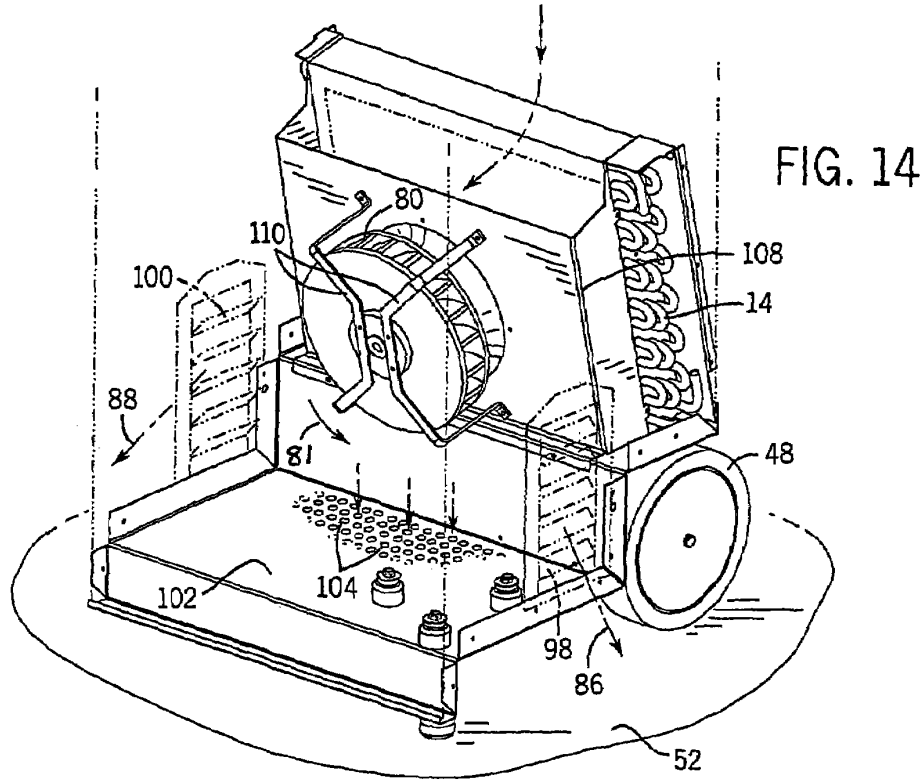
FIG. 13

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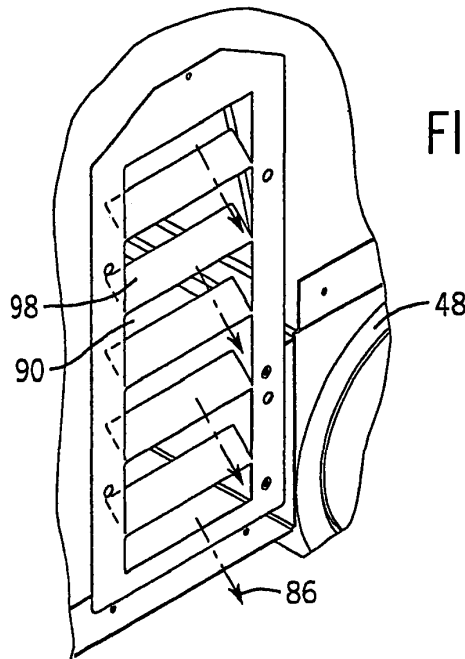


FIG. 16

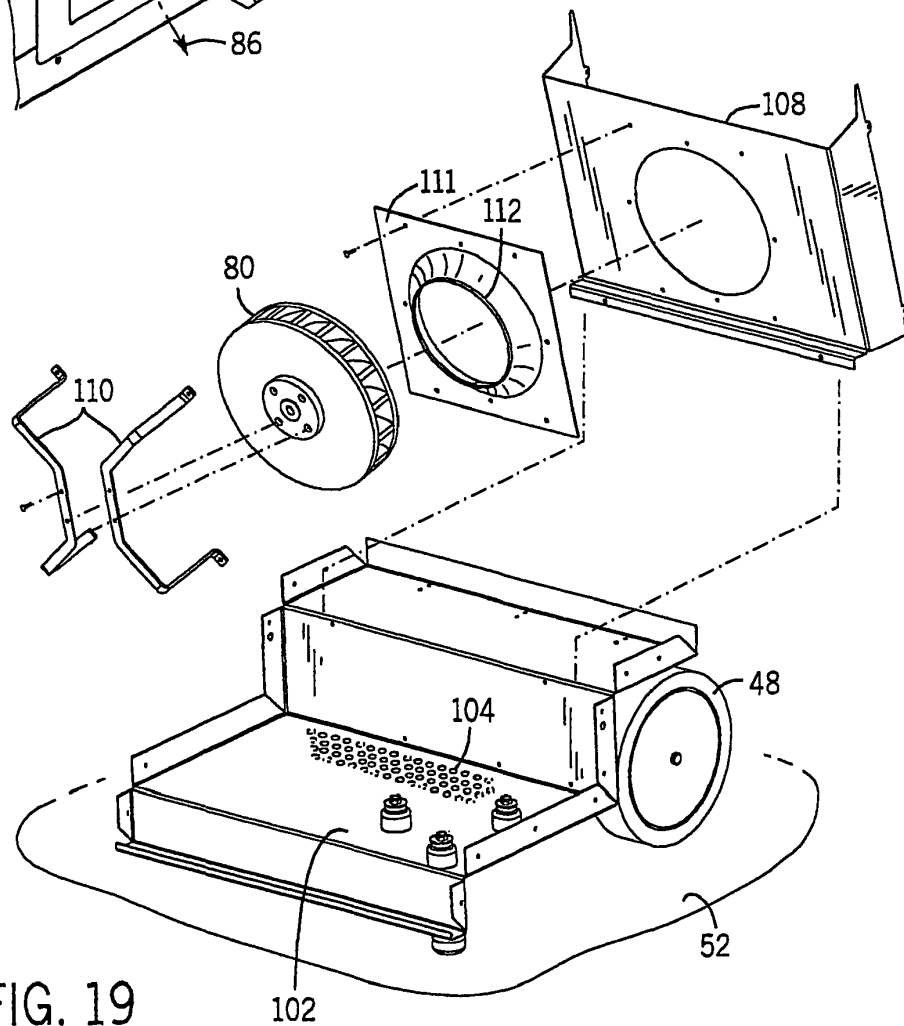


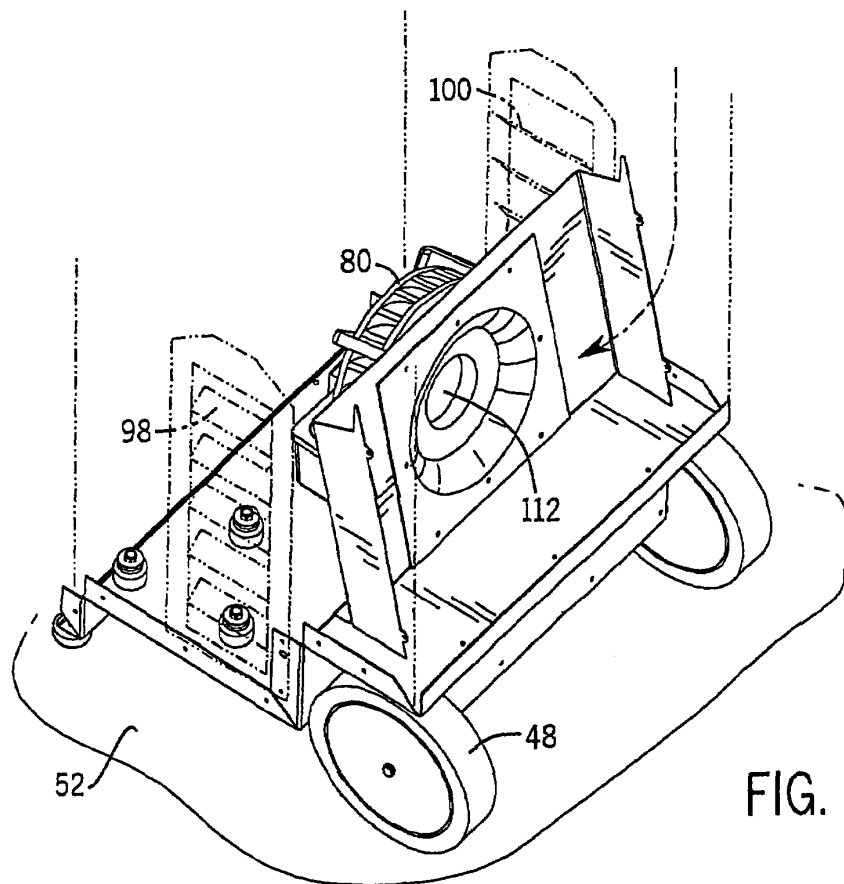
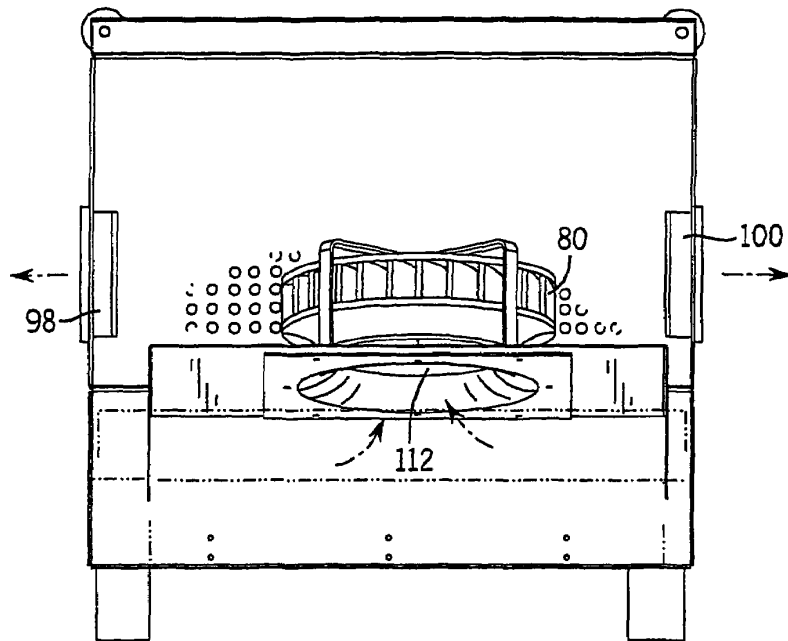
FIG. 19

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ENHANCED DRYING DEHUMIDIFIER**BACKGROUND AND SUMMARY**

The invention relates to dehumidifiers, and more particularly to improved performance and efficiency.

Dehumidifiers are known in the prior art. A compressor delivers hot compressed refrigerant gas. A condenser receives the refrigerant gas and condenses same to hot refrigerant liquid. An expansion device receives the refrigerant liquid from the condenser and expands same to drop the temperature and pressure of the liquid. An evaporator receives the cool liquid refrigerant from the expansion device and evaporates same to cold gas refrigerant, which is returned to the compressor to complete the refrigeration cycle. Air flow is directed across the evaporator to cool the air below the dew point such that water vapor in the air is condensed to liquid to dehumidify the air. The dehumidified air is then directed across the condenser to warm the air.

The present invention arose during continuing development efforts directed toward improved performance and efficiency in a dehumidifier.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 shows a dehumidifier known in the prior art and is taken from FIG. 1 of U.S. Pat. No. 5,031,411, incorporated herein by reference.

FIG. 2 is a schematic illustration of a dehumidification system known in the prior art.

FIG. 3 is a perspective view showing a dehumidifier, including portable cabinet, known in the prior art.

FIG. 4 shows the dehumidifier of FIG. 3 partially broken away, showing prior art.

FIG. 5 is a side view of the dehumidifier of FIG. 4, showing prior art.

FIG. 6 is a perspective view of a dehumidifier, including portable cabinet, in accordance with the present invention.

FIG. 7 is a top elevation view of the dehumidifier of FIG. 6.

FIG. 8 is a side view, partially broken away, of the dehumidifier of FIG. 6.

FIG. 9 is a perspective view, partially broken away, of the dehumidifier of FIG. 6.

FIG. 10 is a schematic illustration of a dehumidifier in accordance with the invention.

FIG. 11 is like FIG. 8 and shows a further embodiment.

FIG. 12 is an end view, partially broken away, of the dehumidifier of FIG. 9.

FIG. 13 is a side view, partially broken away, of a portion of the dehumidifier of FIG. 9.

FIG. 14 is a perspective view of a portion of the structure of FIG. 9.

FIG. 15 is an end view of the structure of FIG. 14.

FIG. 16 is an enlarged perspective view of a portion of the structure of FIG. 9.

FIG. 17 is a top view of a portion of the structure of FIG. 14.

FIG. 18 is a perspective view of a portion of the structure of FIG. 14.

FIG. 19 is an exploded perspective view of the structure of FIG. 14.

DETAILED DESCRIPTION**Prior Art**

FIG. 1 shows a dehumidifier 10 known in the prior art. A compressor 12 delivers compressed hot gas refrigerant. A condenser 14 receives the hot gas refrigerant and condenses

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same to hot liquid refrigerant, and gives up heat to the air flow therethrough. An expansion device 16 receives the hot liquid refrigerant and expands same to a liquid and gas refrigerant mixture of reduced temperature and pressure. Expansion device 16 is typically a flow restrictor, capillary tube, or other pressure reducer. An evaporator 18 receives the cool liquid and gas refrigerant mixture and evaporates the liquid portion to cool gas refrigerant, and absorbs heat from the air flow therethrough. The refrigerant is circulated from compressor 12 to condenser 14 to expansion device 16 to evaporator 18 and back to compressor 12 in a refrigeration cycle. Air flow, typically driven by a fan (not shown), is directed by a duct or housing 19 along a path through evaporator 18 and condenser 14. As the air flows through evaporator 18 from point 20 to point 22, the temperature of the air drops below the dew point such that water vapor in the air is condensed to liquid to dehumidify the air. The air is heated as it flows through condenser 14 from point 22 to point 24, and the warmed and dehumidified air is discharged to the desired space, such as a basement, or other interior space of a house or building.

FIG. 2 further schematically illustrates the dehumidification system of FIG. 1 and uses like reference numerals where appropriate to facilitate understanding. It is known to provide a heat exchanger 26a, 26b for pre-cooling the air upstream of evaporator 18 and then re-heating the air downstream of the evaporator. FIGS. 3-5 show a dehumidifier 28 including a portable cabinet 30, compressor 12 in the cabinet for delivering hot compressed refrigerant, condenser coil 14 in the cabinet and receiving refrigerant from compressor 12 and condensing same, capillary tube expansion device 16 in the cabinet and receiving refrigerant from condenser coil 14 and expanding same, and evaporator coil 18 in the cabinet and receiving refrigerant from expansion device 16 and evaporating same, and delivering the refrigerant to compressor 12. The refrigerant is circulated from compressor 12 to condenser coil 14 to expansion device 16 to evaporator coil 18 and back to compressor 12 in a refrigeration cycle, as is known. Cabinet 30 has an air flow path 32 therethrough, including a first segment 34, FIG. 5, passing ambient air to evaporator coil 18, a second segment 36 passing air from evaporator coil 18 to condenser coil 14, and a third segment 38 discharging air from condenser coil 14. The first, second and third segments, 34, 36 and 38, are in series from upstream to downstream, respectively. Heat exchanger 26 has first and second heat exchange paths 26a and 26b therethrough in heat exchange relation, for example provided by a plurality of layered corrugated sheets providing vertical air flow channels therethrough at 26a in heat exchange relation with a plurality of interdigitated corrugated layered sheets providing horizontal flow channels therethrough at 26b, providing an air-to-air cross flow heat exchanger as is known. Heat exchanger path 26a provides pre-cooled ambient air from which moisture is removed by evaporator coil 18. The removed moisture is collected at collection pan 40 having drainage outlet 42. The air is re-heated at heat exchanger flow path 26b, and the warm dry air is supplied to condenser coil 14 as pulled therethrough by squirrel cage blower 44 which discharges the dehumidified air at outlet 46 as shown as arrow 47. Portable cabinet 30 may be mounted on wheels such as 48 and have a handle such as 50 for maneuvering the cabinet and rolling it along a floor such as 52.

Present Invention

FIGS. 6-19 illustrate the present invention and use like reference numerals from above where appropriate to facilitate understanding.

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In FIGS. 6-10, the air flow path has a fourth segment 62, FIG. 8, passing ambient air to condenser coil 14. Fourth segment 62 is in parallel with second segment 36 of the air flow path. First segment 34 of the air flow path has a first subsegment 34a supplying ambient air to first heat exchange path 26a of the heat exchanger, and has a second subsegment 34b supplying air from first heat exchange path 26a of the heat exchanger to evaporator coil 18. Second segment 36 of the air flow path has a third subsegment 36a supplying air from evaporator coil 18 to second heat exchange path 26b of the heat exchanger, and a fourth subsegment 36b supplying air from second heat exchange path 26b of the heat exchanger to condenser coil 14. Fourth segment 62 is in parallel with fourth subsegment 36b. Segment 62 of the air flow path merges with subsegment 36b of the air flow path downstream of second heat exchange path 26b of heat exchanger 26. Fourth segment 62 of the air flow path is in parallel with each of the noted first and fourth subsegments 34a and 36b of the air flow path. Cabinet 30 has an inlet at grate 64 receiving ambient air at 32 and having first and second branches 64a and 64b. First branch 64a provides the noted first segment 34 of the air flow path. Second branch 64b provides the noted fourth segment 62 of the air flow path. Fourth segment 62 of the air flow path bypasses evaporator coil 18, and preferably bypasses both heat exchanger 26 and evaporator coil 18. Fourth segment 62 of the air flow path merges with second segment 36 upstream of condenser coil 14. The arrangement enhances high temperature performance of the dehumidifier. More moisture is removed over a standard dehumidifier under high ambient temperature conditions. The present dehumidifier operation envelope is increased by bypassing a percentage of incoming ambient air around the evaporator and across the condenser. This extra air mixes with the air from the air-to-air cross flow heat exchanger 26 and lowers the condensing temperature. A lower condensing temperature extends the operation range using the same capacity compressor, evaporator and condenser coils.

In FIG. 11, a desuperheater coil 66 is provided in cabinet 30 and receives refrigerant from compressor 12 and condenses same, and condenser coil 14 is moved to location 14a and receives refrigerant from desuperheater coil 66 and condenses same and supplies the refrigerant to the expansion device as above. Refrigerant is circulated from compressor 12 to desuperheater coil 66 to condenser coil 14 at location 14a to expansion device 16 to evaporator coil 18 and back to compressor 12 in a refrigeration cycle. First segment 34 of the air flow path passes ambient air to evaporator coil 18. Second segment 36 passes air from evaporator coil 18 to condenser coil 14. A third segment 68 passes air from condenser coil 14 at location 14a to desuperheater coil 66. A fourth segment 70 discharges air from desuperheater coil 66. The air flow path has a fifth segment 70 passing ambient air to desuperheater coil 66. First, second, third and fourth segments 34, 36, 68 and 70 of the air flow path in FIG. 11 are in series from upstream to downstream, respectively, and fifth segment 70 is in parallel with third segment 68. Heat exchanger 26 has the noted first and second heat exchange paths 26a and 26b therethrough. First segment 34 of the air flow path has the noted first subsegment 34a supplying ambient air to first heat exchange path 26a of the heat exchanger, and second subsegment 34b supplying air from first heat exchange path 26a of the heat exchanger to evaporator coil 18. Second segment 36 of the air flow path has the noted third subsegment 36a supplying air from evaporator coil 18 to second heat exchange path 26b of the heat exchanger, and fourth subsegment 36b supplying air

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from second heat exchange path 26b of the heat exchanger to condenser coil 14 at location 14a. Fifth segment 70 of the air flow path is in parallel with the noted fourth subsegment 36b after the latter passes through the condenser coil. Fifth segment 70 of the air flow path merges with third segment 68 of the air flow path downstream of condenser coil 14 and upstream of desuperheater coil 66. Fifth segment 70 is in parallel with the noted first subsegment 34a.

Cabinet 30 in FIG. 11 has the noted inlet at grate 64 receiving ambient air at 32 and having the noted first and second branches 64a and 64b. First branch 64a provides first segment 34 of the air flow path. Second branch 64b provides the noted fifth segment 70 of the air flow path. Fifth segment 70 bypasses each of heat exchanger 26 and evaporator coil 18 and condenser coil 14. The arrangement removes more moisture than a standard dehumidifier under high ambient temperature conditions. The present dehumidifier operation envelope is increased by bypassing a percentage of incoming ambient air around the evaporator and across the desuperheater coil. This extra air mixes with the air from the condensing coil at location 14a and lowers the condensing temperature. The combination of desuperheater coil 66 and condenser coil 14 at location 14a captures the lower temperature air for condensing and the higher temperature mixed air for removing the superheat. This provides even greater efficiency than the arrangement of FIGS. 6-10. For example, the vapor temperature exiting the compressor 12 may typically be 140 to 150° F., but the condensing temperature may be about 120° F. This extra 30° F. of superheat is utilized by directing the bypass air at 70 across the desuperheater coil 66, which bypass air was not pre-cooled as is the air flow at 34. Separate coils may be used at 66 and 14a, or alternatively different sections of one coil may be used.

In FIGS. 12-19, squirrel cage blower 44 of FIG. 4 is replaced by an impeller 80 in cabinet 30 downstream of condenser coil 14 and drawing air through the cabinet from upstream to downstream, namely through the noted first, second and third segments 34, 36, 38 of the air flow path in FIGS. 6-10, respectively, and any further air flow path segments such as in FIG. 11. Impeller 80 is preferably a backward incline blade impeller, sometimes called a backward curved impeller, as readily commercially available, for example from Soler & Palau, Inc., 16 Chapin Road, Unit #903, P.O. Box 637, Pine Brook, N.J. 07058.

Impeller 80 rotates about a rotation axis 82, FIG. 13, extending along an axial direction 84 and driven by a motor 85, as is known. As viewed in FIG. 14, impeller 80 rotates counterclockwise, as shown at rotational directional arrow 81. Third segment 38 of the air flow path extends axially along axial direction 84. The air flow path has a further segment 86, and preferably distally opposite segments 86 and 88, FIGS. 14, 15, discharging air from the impeller. Segments 86, 88 extend radially along respective radial directions relative to axial direction 84. Cabinet 30 has an air flow outlet provided by one or more openings 90 in a cabinet sidewall 92 distally oppositely spaced from impeller 80 along the noted radial direction, and has a second air flow outlet provided by one or more openings 94 in cabinet sidewall 96 distally oppositely spaced in the other direction from impeller 80 along the noted radial direction. Cabinet 30 is portable, as above noted, including along a floor such as 52. One or more deflectors 98, FIG. 15, direct exiting air downwardly through openings 90 in cabinet sidewall 92 towards floor 52 exteriorly of cabinet 30 to dry floor 52, such that the dehumidifier is also a water-damage-restoration drying fan. A second set of one or more deflectors 100 direct

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exiting air downwardly through openings **94** in cabinet sidewall **96** towards floor **52** exteriorly of cabinet **30** to dry floor **52**. The respective cabinet sidewall has one or more louvers extending thereacross and angled downwardly to provide the noted sets of deflectors **98**, **100**. In further embodiments, one or more openings **101** may be provided in cabinet front wall **31** along axial direction **84**, providing an air flow outlet therethrough.

Cabinet **30** has a bottom wall **102** with one or more openings **104** therein. The air flow path has a segment **106** passing air from impeller **80** through the one or more openings **104** in bottom wall **102**. The dehumidifier thus has plural air flow outlets, including the air flow outlet along segment **86** through opening **90** in cabinet sidewall **92**, the air flow outlet along segment **88** through opening **94** in cabinet sidewall **96**, and the air flow outlet along segment **106** through opening **104** in bottom wall **102** of the cabinet. The cabinet includes a plenum wall **108** between condenser coil **14** and impeller **80** and mounting the latter thereto at a pair of brackets **110** and having a shroud **111** with an opening **112** therethrough for communicating air from coil **14** to impeller **80** which in turn creates a negative pressure chamber drawing air from upstream to downstream as above noted, through coil **14** and opening **112** for discharge at flow path segments **86**, **88**, **106**. The arrangement provides improved water restoration dehumidification particularly along floor **52** including underneath the dehumidifier cabinet **30**, eliminating moisture shadows underneath the unit and in turn alleviating the need for service personnel to return periodically, e.g. the following day, to relocate the unit to otherwise dry the noted shadow. The backward incline blade impeller improves space efficiency for mounting, air volume, and the amount of air flow per current draw over a centrifugal blower such as a squirrel cage blower at the same air flow conditions. The louvered exits direct the warm dry air downwardly toward the high moisture floor instead of merely allowing dissipation of exiting dry air to the surroundings. This directed air flow enables the dehumidifier to function as a fan (e.g. for water damage restoration) in addition to being a dehumidification device. Solution of the noted moisture shadow problem is optional, through desirable and readily achievable by directing hot warm air underneath the unit as noted.

It is recognized that various equivalents, alternatives and modifications are possible within the scope of the appended claims.

What is claimed is:

1. A dehumidifier comprising:

a cabinet;

a compressor in said cabinet for delivering hot compressed refrigerant;

a condenser coil in said cabinet and receiving refrigerant from said compressor and condensing same;

an expansion device in said cabinet and receiving refrigerant from said condenser coil and expanding same;

an evaporator coil in said cabinet and receiving refrigerant from said expansion device and evaporating same, and delivering said refrigerant to said compressor;

said refrigerant being circulated from said compressor to said condenser coil to said expansion device to said evaporator coil and back to said compressor in a refrigeration cycle;

said cabinet having an air flow path therethrough comprising:

a first segment passing ambient air to said evaporator coil;

a second segment passing air from said evaporator coil to said condenser coil;

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a third segment discharging air from said condenser coil; said first, second and third segments of said air flow path being in series from upstream to downstream, respectively;

an impeller in said cabinet downstream of said condenser coil and drawing air through said cabinet from upstream to downstream, namely through said first, second and third segments of said air flow path, respectively.

2. The dehumidifier according to claim 1 wherein said impeller is a backward incline blade impeller.

3. The dehumidifier according to claim 1 wherein:

said impeller rotates about a rotation axis extending along an axial direction;

said third segment of said air flow path extends axially along said axial direction;

said air flow path has a fourth segment discharging air from said impeller, said fourth segment extending radially along a radial direction relative to said axial direction;

said cabinet has an air flow outlet provided by an opening in a cabinet sidewall distally oppositely spaced from said impeller along said radial direction.

4. The dehumidifier according to claim 3 wherein said cabinet is portable, including along a floor, and comprising one or more deflectors directing exiting air downwardly through said opening in said cabinet sidewall towards said floor exteriorly of said cabinet to dry said floor, such that said dehumidifier is also a water-damage-restoration drying fan.

5. The dehumidifier according to claim 4 wherein said opening in said cabinet sidewall has one or more louvers extending there across and angled downwardly to provide said one or more deflectors.

6. The dehumidifier according to claim 3 wherein:

said cabinet has a bottom wall with an opening therein; said air flow path has a fifth segment passing air from said impeller through said opening in said bottom wall;

such that said dehumidifier comprises two air flow outlets, namely a first air flow outlet along said fourth segment of said air flow path through said opening in said sidewall of said cabinet, and a second air flow outlet along said fifth segment of said air flow path through said opening in said bottom wall of said cabinet.

7. The dehumidifier according to claim 6 wherein said cabinet is portable, including along a floor, and comprising one or more deflectors directing exiting air downwardly through said opening in said sidewall of said cabinet towards said floor to dry same, such that said dehumidifier is also a water-damage-restoration drying fan drying the floor area around said cabinet through said first air flow outlet along said fourth segment of said air flow path through said opening in said sidewall of said cabinet, and also drying the floor area beneath said cabinet through said second air flow outlet along said fifth segment of said air flow path through said opening in said bottom wall of said cabinet.

8. The dehumidifier according to claim 1 wherein said air flow path comprises a fourth segment passing ambient air to said condenser coil.

9. The dehumidifier according to claim 8 wherein said first, second and third segments of said air flow path are in series from upstream to downstream, respectively, and said fourth segment of said air flow path is in parallel with said second segment of said air flow path.

10. The dehumidifier according to claim 9 comprising a heat exchanger having first and second heat exchange paths therethrough in heat exchange relation, and wherein:

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said first segment of said air flow path has first and second subsegments;
 said first subsegment supplies ambient air to said first heat exchange path of said heat exchanger;
 said second subsegment supplies air from said first heat exchange path of said heat exchanger to said evaporator coil;
 said second segment of said air flow path has third and fourth subsegments;
 said third subsegment supplies air from said evaporator coil to said second heat exchange path of said heat exchanger;
 said fourth subsegment supplies air from said second heat exchange path of said heat exchanger to said condenser coil;
 said fourth segment is in parallel with said fourth subsegment.

11. The dehumidifier according to claim **10** wherein said fourth segment of said air flow path merges with said fourth subsegment of said air flow path downstream of said second heat exchange path of said heat exchanger.

12. The dehumidifier according to claim **10** wherein said fourth segment of said air flow path is in parallel with each of said first and fourth subsegments of said air flow path.

13. The dehumidifier according to claim **9** wherein said cabinet has an inlet receiving ambient air and having first and second branches, said first branch providing said first segment of said air flow path, said second branch providing said fourth segment of said air flow path.

14. The dehumidifier according to claim **8** wherein said fourth segment of said air flow path bypasses said evaporator coil.

15. The dehumidifier according to claim **10** wherein said fourth segment of said air flow path bypasses both said heat exchanger and said evaporator coil.

16. A dehumidifier comprising:

a cabinet;
 a compressor in said cabinet for delivering hot compressed refrigerant;
 a desuperheater coil in said cabinet and receiving refrigerant from said compressor and condensing same;
 a condenser coil in said cabinet and receiving refrigerant from said desuperheater coil and condensing same;
 an expansion device in said cabinet and receiving refrigerant from said condenser coil and expanding same;
 an evaporator coil in said cabinet and receiving refrigerant from said expansion device and evaporating same, and delivering said refrigerant to said compressor;
 said refrigerant being circulated from said compressor to said desuperheater coil to said condenser coil to said expansion device to said evaporator coil and back to said compressor in a refrigeration cycle;
 said cabinet having an airflow path therethrough comprising:
 a first segment passing ambient air to said evaporator coil;
 a second segment passing air from said evaporator coil to said condenser coil;
 a third segment passing air from said condenser coil to said desuperheater coil;

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a fourth segment discharging air from said desuperheater coil;

said first, second, third and fourth segments of said air flow path being in series from upstream to downstream, respectively;

an impeller in said cabinet downstream of said desuperheater coil and drawing air through said cabinet from upstream to downstream, namely through said first, second, third and fourth segments of said air flow path, respectively.

17. The dehumidifier according to claim **16** wherein said air flow path comprises a fifth segment passing ambient air to said desuperheater coil.

18. The dehumidifier according to claim **17** wherein said first, second, third and fourth segments of said airflow path are in series from upstream to downstream, respectively, and said fifth segment of said air flow path is in parallel with said third segment of said air flow path.

19. The dehumidifier according to claim **18** comprising a heat exchanger having first and second heat exchange paths therethrough in heat exchange relation, and wherein:

said first segment of said airflow path has first and second subsegments;

said first subsegment supplies ambient air to said first heat exchange path of said heat exchanger;

said second subsegment supplies air from said first heat exchange path of said heat exchanger to said evaporator coil;

said second segment of said airflow path has third and fourth subsegments;

said third subsegment supplies air from said evaporator coil to said second heat exchange path of said heat exchanger;

said fourth subsegment supplies air from said second heat exchange path of said heat exchanger to said condenser coil;

said fifth segment is in parallel with said fourth subsegment after the latter passes through said condenser coil.

20. The dehumidifier according to claim **19** wherein said fifth segment of said airflow path is in parallel with said first subsegment of said airflow path.

21. The dehumidifier according to claim **18** wherein said fifth segment of said airflow path merges with said third segment of said airflow path downstream of said condenser coil and upstream of said desuperheater coil.

22. The dehumidifier according to claim **18** wherein said cabinet has an inlet receiving ambient air and having first and second branches, said first branch providing said first segment of said airflow path, said second branch providing said fifth segment of said airflow path.

23. The dehumidifier according to claim **17** wherein said fifth segment of said airflow path bypasses both said evaporator coil and said condenser coil.

24. The dehumidifier according to claim **19** wherein said fifth segment of said airflow path bypasses each of said heat exchanger and said evaporator coil and said condenser coil.

* * * * *



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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

ABATEMENT TECHNOLOGIES, INC.
Requester, Respondent

v.

TECHNOLOGIES HOLDINGS CORP.¹
Patent Owner, Appellant

Appeal 2013-001119
Reexamination Control 95/001,362
Patent US 7,246,503 B1²
Technology Center 3900

Before DANIEL S. SONG, JOSIAH C. COCKS and
MICHAEL J. FITZPATRICK, *Administrative Patent Judges*.

SONG, *Administrative Patent Judge*.

DECISION ON APPEAL

¹ Therma-Stor LLC is said to be the exclusive licensee of the patent (Appeal Brief (hereinafter "App. Br.") 1.

² Issued July 24, 2007 to O'Brien et al. (hereinafter "'503 patent").

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STATEMENT OF THE CASE

The Patent Owner appeals under 35 U.S.C. §§ 134 and 315 (2002) from a Final Rejection of claims 12, 25 and 26, claims 25 and 26 having been added during the reexamination. The remaining claims are either not the subject of the present reexamination, or have been canceled (App. Br. 2). The Requester does not cross-appeal any proposed rejection not adopted by the Examiner. We have jurisdiction under 35 U.S.C. §§ 134 and 315 (2002).

It is our understanding that the '503 patent is presently involved in infringement litigations entitled:

1. *Therma-Stor, LLC et al. v. Abatement Technologies, Inc.*, 1:10-cv-292 (N.D. Georgia), which has been stayed pending final resolution of the reexamination proceedings (App. Br. 2); and

2. *Therma-Stor, LLC and Technologies Holdings Corp. v. Abatement Technologies, Inc. and Applied Comfort Products, Inc.* 1:2010cv00035 (N.D. Georgia) (Rebuttal Brief (hereinafter "Reb. Br.") 6-7).

In support of patentability, the Patent Owner relies on its Appeal Brief, Rebuttal Brief, the Declaration of inventor O'Brien dated July 27, 2010, and the Second Declaration of O'Brien dated December 29, 2010 (hereinafter "2nd Decl.") with exhibits attached thereto. In support of the Examiner's rejections, the Requester relies on its Respondent Brief (hereinafter "Resp. Br.") and the Declaration of Brown dated January 18, 2011.

The claimed invention is directed generally to a dehumidifier that includes an air-to-air heat exchanger as well as a bypass wherein a segment of an air flow path "is in parallel with" another segment. Representative

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independent claim 12 reads as follows (App. Br. 26-27, paragraphing and emphasis added):

12. A dehumidifier comprising:
 - a cabinet;
 - a compressor in said cabinet for delivering hot compressed refrigerant;
 - a condenser coil in said cabinet and receiving refrigerant from said compressor and condensing same;
 - an expansion device in said cabinet and receiving refrigerant from said condenser coil and expanding same;
 - an evaporator coil in said cabinet and receiving refrigerant from said expansion device and evaporating same, and delivering said refrigerant to said compressor;
 - said refrigerant being circulated from said compressor to said condenser coil to said expansion device to said evaporator coil and back to said compressor in a refrigeration cycle;
 - said cabinet having an air flow path therethrough comprising:
 - a first segment passing ambient air to said evaporator coil;
 - a second segment passing air from said evaporator coil to said condenser coil;*
 - a third segment discharging air from said condenser coil;
 - said first, second and third segments of said air flow path being in series from upstream to downstream, respectively;*
 - an impeller in said cabinet downstream of said condenser coil and drawing air through said cabinet from upstream to downstream, namely through said first, second and third segments of said air flow path, respectively;
 - wherein said air flow path comprises a fourth segment passing ambient air to said condenser coil; said fourth segment of said air flow path is in parallel with said second segment of said air flow path;*

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comprising a heat exchanger having first and second heat exchange paths therethrough in heat exchange relation, and wherein:
 said first segment of said air flow path has first and second subsegments;
 said first subsegment supplies ambient air to said first heat exchange path of said heat exchanger;
 said second subsegment supplies air from said first heat exchange path of said heat exchanger to said evaporator coil;
 said second segment of said air flow path has third and fourth subsegments;
 said third subsegment supplies air from said evaporator coil to said second heat exchange path of said heat exchanger;
 said fourth subsegment supplies air from said second heat exchange path of said heat exchanger to said condenser coil;
 wherein said fourth segment of said air flow path is in parallel with each of said first and fourth subsegments of said air flow path.

The Examiner rejected the various claims under 35 U.S.C. § 103(a) as obvious over the noted combination of prior art references in 29 different grounds of rejections (*see* Right of Appeal Notice³ 15-29), which can be grouped as follows:

1. Claims 12, 25 and 26 over the combination of Orion⁴ and one of Lewis,⁵ Miyoshi,⁶ Adachi⁷ or Wetzler⁸ (Grounds 22-25).

³ The Examiner's Answer mailed May 4, 2012 merely incorporates by reference the Right of Appeal Notice mailed December 16, 2011 (hereinafter "RAN"), and thus, we cite to the RAN.

⁴ Orion Dehumidifier, Ebac Industrial Products, Inc. (1999).

⁵ Donald C. Lewis, U.S. 4,250,629 (February 17, 1981).

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2. Claim 25 over the combination of Admitted Prior Art (hereinafter "APA")⁹ and one of Adachi, Lewis, Miyoshi or Wetzler (Grounds 29-32, 34).
3. Claim 25 over Harris¹⁰ (Ground 33).
4. Claim 25 over the combination of APA and Harris (Ground 34).
5. Claims 25 and 26 over the combination of Orion and Harris (Ground 35).
6. Claim 26 over the combination of APA and Adachi, and in further view of one of Stokes,¹¹ Fan Performance¹² or Orion (Grounds 36-38).
7. Claim 26 over the combination of APA and Lewis, and in further view of one of Stokes, Fan Performance or Orion (Grounds 39-41).
8. Claim 26 over the combination of APA and Miyoshi, and in further view of one of Stokes, Fan Performance or Orion (Grounds 42-44).
9. Claim 26 over the combination of APA and Wetzler, and in further view of one of Stokes, Fan Performance or Orion (Grounds 45-47).
10. Claim 26 over the combination of APA and Harris, and in further view of one of Stokes, Fan Performance or Orion (Grounds 48-50).

⁶ Tatsou Miyoshi, JP H-09-8297 (Pub. April 4, 1997).

⁷ Keisuke Adachi, JP 2002-188827 (Pub. July 5, 2002).

⁸ Robert Wetzler, DE 87 07 953.4 (Pub. August 25, 1998).

⁹ Figures 1-5 in the Specification of the '503 patent, and associated discussions therein.

¹⁰ Arvel R. Harris, U.S. 2,682,758 (July 6, 1954).

¹¹ Walter S. Stokes, U.S. 4,531,890 (July 30, 1985).

¹² Fan Performance Characteristics of Centrifugal Fans, Engineering Data, ED-2400 (2000).

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11. Claim 26 over the combination of Harris in view of one of Stokes, Fan Performance or Orion (Grounds 51-53).

We AFFIRM.

ISSUES

The following issues have been raised in the present appeal.

1. Whether the Examiner erred in interpreting the claim limitation "in parallel with."
2. Whether the Examiner erred in rejecting claims 12, 25 and 26 as obvious based on the prior art of record.
3. Whether the Patent Owner has established unexpected results of the claimed invention through the submitted evidence.

FINDINGS OF FACT

The record supports the following findings of fact (FF) by a preponderance of the evidence.

1. The Specification of the '503 patent states:
 - A. "It is known to provide a heat exchanger 26a, 26b for pre-cooling the air upstream of evaporator 18 and then re-heating the air downstream of the evaporator." (Col. 2, ll. 24-27; Figs. 2-5).
 - B. "The first, second and third segments, 34, 36 and 38, are in series from upstream to downstream, respectively." (Col. 2, ll. 43-44; Fig. 5 (prior art)).
 - C. "First, second, third and fourth segments 34, 36, 68 and 70 of the air flow path in FIG. 11 are in series from upstream to

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downstream, respectively, and fifth segment 70 is in parallel with third segment 68." (Col. 3, ll. 54-57).

D. "In FIGS. 6-10, the air flow path has a fourth segment 62, FIG. 8, passing ambient air to condenser coil 14. Fourth segment 62 is in parallel with second segment 36 of the air flow path." (Col. 3, ll. 1-4; Fig. 8).

E. "Fourth segment 62 is in parallel with fourth subsegment 36b." (Col. 3, ll. 13-14; Fig. 8).

F. "Fourth segment 62 of the air flow path is in parallel with each of the noted first and fourth subsegments 34a and 36b of the air flow path." (Col. 3, ll. 17-19; Fig. 8).

2. A. Orion discloses a dehumidifier with an "air to air heat exchanger, where the incoming air is pre-cooled." ("Operation").

B. The dehumidifier of Orion does not include a bypass.

3. A. Lewis discloses a kiln with a dehumidifier, "said dehumidifier defining a flow path through the evaporator and a bypass passage [40] around the evaporator." (Abst.; Fig. 1; *see also* Col. 4, ll. 6-8).

B. Lewis states that the described invention operates "over a wide range of temperatures" and that it "var[ies] the amount of air passing over the cooling unit of the dehumidifier in such a way as to prevent the compressor from being overloaded and from being overheated." (Col. 2, ll. 12-19).

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4. A. Miyoshi discloses dehumidifier wherein "[a] bypass air pathway 16 is provided that leads from an intake opening 2 to condenser 3 without passing through an evaporator 1, part of the entire air volume flows in to the bypass pathway 16 as bypass air volume." (Abst.; Fig. 1).

B. Miyoshi states that the benefit of the bypass is that "the dryness of the cooling medium gas at high temperatures can be suppressed," and "the air speed passing through the evaporator 1 is not increased, thus preventing an increase in wet heat exchange and increasing latent heat exchange, which improves dehumidification capacity." (¶ (0015)).

5. A. Adachi discloses a dehumidifier including "a bypass route 7 leading from the auxiliary inlet port 9 to a condenser" so that part of the air passes "through the bypass route 7 to the condenser 12." (Abst.; ¶ (0020); Fig. 1)

B. Adachi states that such bypass "reduces the load on the evaporator 11" (¶ (0020)).

6. Wetzler discloses a device for dehumidifying air with bypass dampers 30 that allow room or fresh air stream 31 to be drawn into the second chamber 28 and mixed with the dehumidified air stream. (Pgs. 11-12; Fig. 2).

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7. A. Harris discloses a dehumidifier with a heat exchanger 77 and a top opening 74, wherein "[r]oom air will flow directly into contact with condenser 64 through top opening 74" (col. 5, ll. 13-24; Fig. 3) so as to function as a bypass.

B. Harris teaches that by having the room air flow directly into contact with condenser 64 through top opening 74, "the temperature of the evaporator will be held at a lower value whereby a larger quantity of water will be condensed from the air." (Col. 5, ll. 19-24).

C. Harris further teaches that:

The heat exchange unit placed between the condenser and evaporator provides a means of pre-cooling the incoming air before it contacts the evaporator and allows a greater portion of the capacity of the evaporator to be used for removing latent heat from the air. By providing the bypass opening for passing air directly into contact with the condenser, a smaller volume of air will flow over the surfaces of the evaporator whereby the temperature of the evaporator will be maintained at a lower value.
(Col. 5, ll. 29-39).

8. Stokes discloses a centrifugal fan impeller (Abst.).

9. Fan Performance discloses fan performance characteristics of centrifugal fans (Title).

PRINCIPLES OF LAW

Claims are to be given their broadest reasonable interpretation consistent with the specification, reading claim language in light of the specification as it would be interpreted by one of ordinary skill in the art. *In*

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re Am. Acad. of Sci. Tech. Ctr., 367 F.3d 1359, 1364 (Fed. Cir. 2004). This is the standard for claim interpretation in both original examination and re-examination. *See In re ICON Health and Fitness, Inc.*, 496 F.3d 1374, 1379 (Fed. Cir. 2007).

Whether an invention has produced unexpected results is a question of fact. *In re Mayne*, 104 F.3d 1339, 1343 (Fed. Cir. 1997). "[T]here is no hard-and-fast rule for determining whether evidence of unexpected results is sufficient to rebut a *prima facie* case of obviousness." *Kao Corp. v. Unilever U.S., Inc.*, 441 F.3d 963, 970 (Fed. Cir. 2006); *see also In re Dillon*, 919 F.2d 688, 692-93 (Fed.Cir.1990) ("[e]ach situation must be considered on its own facts."). However, a party asserting unexpected results as evidence of nonobviousness has the burden of proving that the results are unexpected. *In re Geisler*, 116 F.3d 1465, 1469-70 (Fed. Cir. 1997). "[I]t is not enough to show that results are obtained which differ from those obtained in the prior art: that difference must be shown to be an unexpected difference." *In re Klosak*, 455 F.2d 1077, 1080 (CCPA 1972). Moreover, "when an inventor tries to distinguish his claims from the prior art by introducing evidence of unexpected 'synergistic' properties, the evidence should at least demonstrate 'an effect greater than the sum of the several effects taken separately.'" *Merck & Co., Inc. v. Biocraft Lab., Inc.*, 874 F.2d 804, 808 (Fed. Cir. 1989).

ANALYSIS

Preliminarily, we note that only those arguments actually made by the Patent Owner have been considered and other arguments not made are

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deemed to be waived. *See* 37 C.F.R. § 41.67(c)(1)(vii). We further consider and address only those arguments pertinent to the disposition of the present appeal, albeit in a slightly different order than that presented in the Patent Owner's briefs.

Claim Construction

The Patent Owner initially argues that the Examiner erred in construing the claim "in parallel with" "as including a 'parallel flow' relation and excluding a 'geometrically parallel' configuration." (App. Br. 10; *see also* Reb. Br. 2). The Patent Owner asserts that this limitation requires "both a parallel flow relation and a geometrically parallel configuration." (App. Br. 10; *see also* Reb. Br. 2).

The Examiner disagrees and states that because the specification of the '503 patent does not provide a definition of this limitation and "[p]arallel flow arrangements are well known to ordinary practitioners in the art," a person of ordinary skill in the art "would consider the parallel flow or geometrically parallel to be applicable to the disclosure, [and] either definition is seen to be included in the broadest reasonable interpretation of the claims." (RAN 45). Hence, the Examiner states that "[t]he claims are seen to claim that the flows are 'in parallel' flow configuration, as compared to in series. In the instant case, flows that originate at the same place (ambient air) and take different paths (either through the evaporator or through the bypass passage) and meet at a common point (the entrance to the condenser) are seen to be in a parallel configuration." (RAN 43-44).

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Thus, the Patent Owner argues that both meanings (which are not exclusive of each other) apply to the limitation so that "in parallel with" means both "parallel flow" *and* "geometrically parallel," whereas the Examiner interprets the limitation to mean "parallel flow" *or* "geometrically parallel." We agree with the Examiner's claim interpretation.

Firstly, we observe that in reexaminations, the broadest reasonable interpretation consistent with the specification is applied. *In re Am. Acad. of Sci. Tech. Ctr.*, 367 F.3d at 1364. Given that there are two possible, non-exclusive meanings to the term "parallel" in the art, it is appropriate to apply the broader interpretation, namely, "parallel flow" *or* "geometrically parallel." That interpretation is consistent with the specification of the '503 patent which describes and illustrates such parallel flow of the fourth segment 62 with the second segment 36 of the air flow path (FF 1D). To interpret the claim to require both "parallel flow" *and* "geometrically parallel" as advocated by the Patent Owner is not the broadest interpretation consistent with the specification of the '503 patent.

Secondly, the Patent Owner's asserted interpretation requiring "geometrically parallel" in addition to parallel flow is not entirely consistent with the specification of the '503 patent which states that the "[f]ourth segment 62 is parallel with fourth subsegment 36b" (FF 1E; *see also* FF 1F). Figure 8 clearly illustrates that a portion of the fourth subsegment 36b is actually perpendicular to the fourth segment 62, another portion of the fourth subsegment 36b is at an angle to the fourth segment 62, and yet another portion of the fourth subsegment 36b is geometrically parallel to the fourth segment (*id.*; *see also* RAN 45). Hence, the use of the language "in parallel

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with" within the specification of the '503 patent is not entirely consistent with "geometrically parallel" meaning advocated by the Patent Owner because the fourth subsegment includes substantial portions that are clearly not geometrically parallel.

Thirdly, the claims recite "in parallel with" instead of "parallel to," the latter being more consistent with a geometric reading of the limitation. In this regard, we observe that in addition to passages in the specification of the '503 patent that recite "in parallel with," the specification also utilizes the contrasting flow language "in series" with respect to air flow path segments (FF 1B, 1C) thereby giving support to the Examiner's interpretation that the limitation "in parallel with" refers to parallel flow.

Therefore, in view of the above, we agree with the Examiner that the broadest reasonable interpretation of the limitation "in parallel with" in view of the specification of the '503 patent is either "parallel flow" *or* "geometrically parallel."

Rejections of Claim 12 (Grounds 22-25)

The Examiner rejected claim 12 relying on Orion for disclosing a dehumidifier with a heat exchanger, but because the dehumidifier of Orion does not include a bypass (FF 2A, 2B), the Examiner relied upon one of Lewis, Miyoshi, Adachi or Wetzler for disclosing a humidifier with a bypass and reasons for providing such a bypass (FF 3A-6) concluding that the combination renders the claims unpatentable (RAN 15-19, 40). In particular, the Examiner states that "[a]s Lewis, Miyoshi and Adachi teach the use of a bypass to increase the efficiency and capacity of a dehumidifier,

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one of ordinary skill in the art would be motivated to try a bypass on a dehumidifier with a heat exchanger (such as Orion) to try to derive similar improvements." (RAN 42). We find no reversible error in the Examiner's conclusions and address the Patent Owner's arguments below.

The Patent Owner notes that claim 12 recites that the fourth segment of the airflow path is in parallel with the second segment and the first and fourth subsegments of the airflow path. (App. Br. 17). The Patent Owner asserts that modifying Orion to include a bypass requires realigning the heat exchanger vertically because there is no space for a bypass air passageway, and "would change the principle of operation of Orion and render the Orion heat exchanger *inoperable* for its intended purpose." (App. Br. 18, emphasis in original). However, we agree with the Examiner that "[s]uch statements of physical incorporation bear little patentable weight in a 103 rejection, as the secondary references lead an ordinary practitioner to modify the dehumidifier." (RAN 41, 46-47). We also agree with the Examiner that addition of a bypass would not alter the principle of operation of Orion which is "the removal of water vapor using an evaporator of a vapor compression system and using a heat exchanger to precool the air entering the evaporator." (RAN 42, 47).

The Patent Owner argues that Orion discloses a narrow operating range "well below the upper high-temperature range provided by the claimed solution" and such dehumidifiers without a bypass are ineffective in high-temperature ranges so as to teach away from claimed invention (App. Br. 18). However, in addition to the fact that a temperature range is not recited in the claims as noted by the Examiner, we also agree that the secondary

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references provide "sufficient reasons to add the bypass to the dehumidifier with a heat exchanger" (RAN 40; *see e.g.*, FF 3B, 4B, 5B).

The Patent Owner also argues that in Orion, the first subsegment is not geometrically parallel to Requester suggested bypass flow (App. Br. 18-19) and that Lewis and Wetzler do not disclose a fourth segment that is parallel to the first subsegment (App. Br. 20-21). The Patent Owner further asserts that the Examiner's rejection is based on *ex post* reasoning because there is no teaching with respect to a fourth segment being "in parallel" with each of the first and fourth subsegments (Reb. Br. 3). However, these arguments are premised on an improperly narrow interpretation of the limitation "in parallel with" as discussed in detail *supra*. Lewis, Miyoshi, Adachi and Wetzler each discloses a bypass flow that provides ambient air directly to the condenser (thereby bypassing the evaporator), which satisfies the claim language. Thus, these arguments are not persuasive to establish that the Examiner erred.

The Patent Owner further argues that Lewis, Miyoshi, Adachi and Wetzler do not disclose a fourth segment in parallel with the fourth subsegment because "they fail to disclose a heat exchanger, and any attempt to add a heat exchanger to these designs would change the principal [sic] of operation while requiring severe modification and reconfiguration." (App. Br. 20; Reb. Br. 6). However, this argument mischaracterizes the rejections which are based on modifying Orion with its heat exchanger to provide the bypass as taught by Lewis, Miyoshi, Adachi or Wetzler, and attacks these references individually. The rejection as adopted by the Examiner is not

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premised on modifying the secondary references to include a heat exchanger.

Therefore, in view of the above, the Examiner's rejections of claim 12 are sustained.

Rejections of Claim 25 (Grounds 22-25, 29-35)

The Examiner rejected claim 25 based on various different grounds including those principally based on Orion (Grounds 22-25, 35), as well as principally based on APA (Grounds 29-32, 34; RAN 19-22), and based on Harris (Ground 33; RAN 22-23, 46).

As to Harris, the Patent Owner argues that it fails to disclose a fourth segment that is geometrically parallel to first heat exchange path, first subsegment and fourth subsegment (App. Br. 21-22). However, this argument is unpersuasive because it is premised on an improperly narrow interpretation of the limitation "in parallel with" as discussed in detail *supra*.

The Patent Owner also asserts that the rejections based principally on Orion or APA should be reversed because the combinations do not "demonstrate" that the fourth segment is perpendicular to the second heat exchange path, and merges with the fourth subsegment downstream of the second heat exchange path (App. Br. 23-24). However, this argument is unpersuasive in that it attacks the references separately, and does not take into account what the collective teachings of the prior art Lewis, Miyoshi, Adachi or Wetzler would have suggested to one of ordinary skill in the art in the context of implementing a bypass which provides ambient air via a parallel flow to the condenser while bypassing the evaporator. *See In re*

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Keller, 642 F.2d 413, 425 (CCPA 1981); *In re Merck*, 800 F.2d 1091, 1097 (Fed. Cir. 1986). We agree with the Examiner that such recited flows would have been obvious to one of ordinary skill in the art when the prior art dehumidifiers of Orion or APA, which include heat exchangers, are modified to include a bypass.

The Patent Owner again argues that Lewis, Miyoshi, Adachi and Wetzler do not disclose a fourth segment in parallel with the fourth subsegment or perpendicular to the second heat exchange path because "they fail to disclose a heat exchanger" and their designs are "incapable of incorporating a heat exchanger without substantial modification and operability changes." (App. Br. 23). However, as discussed *supra*, this argument mischaracterizes the rejections which are based on modifying Orion or APA that already include a heat exchanger based on the teachings of Lewis, Miyoshi, Adachi and Wetzler with respect to a bypass.

Therefore, in view of the above, the Examiner's rejections of claim 25 are sustained.

Rejections of Claim 26 (Grounds 22-25, 35-53)

The Examiner rejected claim 26 under various grounds principally based on Orion, APA or Harris (RAN 24-29; Grounds 22-25, 35-53). The Patent Owner merely relies on dependency from claim 25 for patentability of claim 26 (App. Br. 24). Thus, the Examiner's rejections of claim 26 are sustained as well.

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Declaration Evidence

The named inventor Mr. O'Brien (hereinafter "declarant") states that there is an increasing need in the art to operate dehumidifiers efficiently at higher temperatures and that the problems with existing humidifiers and solutions for those problems were not known to those in the art (2nd Decl. of O'Brien, ¶ 10). The declarant states that a successful solution has been found which "incorporat[es] an ambient air bypass to the condenser in combination with an air-to-air heat exchanger." (2nd Decl. of O'Brien, ¶ 14). The Patent Owner argues that the Declarations of O'Brien "provide evidentiary support for the unexpectedly improved results" which is sufficient to rebut any initial conclusion of obviousness (App. Br. 15).

The Examiner disagrees and finds the test evidence to be unclear and insufficient to establish unexpected results (RAN 47-48). The Examiner states that "[w]here the unexpected properties of a claimed invention are not shown to have significance equal to or greater than [sic] the expected properties, the evidence of unexpected properties may not be sufficient to rebut the evidence of obviousness." (RAN 43). Having considered the evidence and the arguments of the Patent Owner, we agree with the Examiner that the Patent Owner has not demonstrated unexpected results.

The declarant initially asserts that the "[u]se of a bypass to the condenser was counter-intuitive to those of ordinary skill because non-dehumidified ambient air was introduced into the system after moisture was removed by the evaporator and after the air was re-heated by the air-to-air heat exchanger. Accordingly, other engineers were skeptical of this approach ..." (2nd Decl. of O'Brien, ¶ 14). The declarant also asserts that "it

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was surprisingly found that the addition of bypass to a dehumidifier with an air-to-air heat exchanger is much less damaging to the condensing pressure of the refrigeration system than expected to one of ordinary skill in the art." (2nd Decl. of O'Brien, ¶¶ 17).

However, dehumidifiers with an air-to-air heat exchanger were well known and practiced within the art for "pre-cooling the air upstream of evaporator [] and then re-heating the air downstream of the evaporator." (FF 1A, 2A). Furthermore, dehumidifiers with a bypass were well known and practiced within the art for various reasons (FF 3A-7C). These numerous reasons include preventing overloading and overheating (FF 3B), "improv[ing] dehumidification capacity" (FF 4B), "reduc[ing] the load on the evaporator" (FF 5B), and maintaining the temperature of the evaporator at a lower temperature so that "a larger quantity of water will be condensed from the air." (FF 7B, 7C).

The declarant and the evidence do not adequately establish that one of ordinary skill in the art would expect interaction between a heat exchanger and the bypass that would result in increasing the condensing pressure which would dissuade one of ordinary skill in the art from providing both features for their known benefits. It is unclear why the benefits of the bypass recognized in the art (FF 3B, 4B, 5B, 7C) would teach or otherwise lead one of ordinary skill to exclude pre-cooling the air by a heat exchanger, or vice-versa. The declarant does not persuasively establish that such provision of a heat exchanger would be expected by those in the art to nullify the benefits of a bypass recognized in the art, and vice-versa, so as to dissuade one in the art from providing both features in a dehumidifier.

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While the declaration appears to assert that providing the bypass in a dehumidifier with a heat exchanger would be expected by one of ordinary skill to increase the temperature of the air too much so as to increase the condensing pressure and decrease the refrigerant mass flow rate, and this expectation was found to be surprisingly untrue (2nd Decl. of O'Brien, ¶¶ 14-18), the declaration does not provide adequate evidence in support thereof. In this regard, the declaration provides an example wherein "the 102°F air stream leaving the heat exchanger will mix with the 115°F ambient air stream bypassing the evaporator...The mixed temperature may be about 106°F in a typical system." (2nd Decl. of O'Brien, ¶ 18). The declarant does not adequately demonstrate or explain why the incremental increase of 4°F in temperature of the mixed air provided to the condenser would have been unexpected, or why it would have been expected that such incremental increase would be damaging to the condensing pressure to dissuade one of ordinary skill from providing a bypass. Instead, the asserted surprise of the declarant appears to be premised on the realization that the heat exchanger is very effective in raising the temperature of the air after the evaporator close to the ambient air temperature, i.e., within 4°F, so as to minimally impact the condensing pressure (*id.*). However, in our view, such realization with respect to the effectiveness of the heat exchanger does not support the assertion that a person of ordinary skill in the art would be dissuaded from providing a bypass in such a dehumidifier with a heat exchanger.

Turning to the most relevant tests conducted, the declarant states that a modified Phoenix 200 Max dehumidifier with air-to-air heat exchanger but without bypass was tested against a second further modified dehumidifier

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with bypass, and the dehumidifier with the bypass demonstrated 55.7% increase in performance (pints per day or "ppd") at 90°F and 20% relative humidity, and 54.5% increase in efficiency (pints per kilowatt or "ppkw"); and 67.5% increase in performance (ppd) at 105°F and 20% relative humidity, and 70% increase in efficiency (ppkw) (2nd Decl. of O'Brien, ¶ 22). The declarant further states that a third further modified dehumidifier with a larger bypass was also tested and it demonstrated 41.8% increase in performance (ppd) at 90°F and 20% relative humidity, and 54.4% increase in efficiency (ppkw); and 109% increase in performance (ppd) at 109°F and 20% relative humidity, and 210% increase in efficiency (ppkw) (*Id.* at ¶ 23). The declarant asserts that "[t]hus, by combining [sic] a condenser bypass with a heat exchanger, substantial unexpected results were achieved that met unsolved needs in the industry." (*Id.* at ¶ 24).

The above tests and results described by the declarant clearly do establish the performance and efficiency benefits of providing bypass in a dehumidifier that includes a heat exchanger. However, such evidence fails to establish that the observed benefits are "unexpected." As discussed *supra*, the prior art already establishes benefits associated with providing a bypass in a dehumidifier (FF 3A-7C). The evidence does not establish what performance gains would have been expected by one of ordinary skill in the art from implementing a bypass in a dehumidifier with a heat exchanger. The evidence also does not establish how the actual results attained in the implementation of a bypass deviates from the expected results so as to demonstrate "unexpected results" that are said to be surprising as asserted by the Patent Owner. The Patent Owner has the burden of proving that the

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results are unexpected, not merely that the results differ from the prior art. *In re Geisler*, 116 F.3d at 1469-70; *In re Klosak*, 455 F.2d at 1080.

The declarant also refers to tests set forth in the first declaration wherein the declarant compared a "dehumidifier equipped as described in the preferred embodiment of the '503" patent against a dehumidifier as described in the prior art" that have "similar system components that were of a similar physical size and compressor rating." (2nd Decl. of O'Brien, ¶ 25; *see also* App. Br. 15). However, these tests are less persuasive than those tests discussed *supra* with respect to the modified Phoenix 200 Max dehumidifier because the compared dehumidifiers in the first declaration, while said to be "similar," are nonetheless not the same with respect to their various components and construction. Such differences unaccounted for in the testing invariably impacts the performance of such dehumidifiers and diminishes the significance and reliability of any comparative test data derived therefrom. At most, these tests appear to establish benefit of providing bypass, but again, they fail to establish that the benefit was "unexpected" for the same reasons discussed *supra*.

The Patent Owner also asserts that "[a]s explained by Mr. O'Brien, the design of the geometrically parallel airflow paths contributes to the significant unexpectedly improved properties and properties not present in the prior art." (App. Br. 16). In particular, the declarant states "[t]he substantially geometric parallel air flow paths described in the '503 patent help the dehumidification units achieve the high efficiency of pints per kilowatt hour (ppkw) demonstrated in Ex. A by reducing restrictions or impedance of the airflow paths, thus reducing the amount of energy

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necessary to draw the necessary large volume of air to be dehumidified and the bypassed air through the unit." (2nd Decl. of O'Brien, ¶ 27). The declarant concludes "Overall, this novel combination of claimed features, i.e., a *bypass air flow segment* in combination with a *heat exchanger* and the noted *parallel air flow paths*, provides unexpectedly improved properties and properties not present in the prior art, including...." (2nd Decl. of O'Brien, ¶ 28, emphasis in original; *see also* App. Br. 11-12).

However, there is no persuasive evidence or testing to substantiate the assertion that the parallel air flow paths had any unexpected impact on the improved performance and efficiency of the dehumidifiers tested. It cannot be reasonably asserted that it is surprising or unexpected that "reducing restrictions or impedance of the airflow paths" results in decrease in energy use. Such a result would have been entirely expected. There is also insufficient evidence to persuasively demonstrate that the parallel air flow paths had any substantial impact in realization of the improved performance and efficiency of the tested dehumidifiers, or even that the gains are not merely attributable to the bypass and the air-to-air exchanger, for example, by comparing energy consumption of humidifier with and without the parallel air flow.

More importantly, there is no persuasive evidence that the result attained is not merely the sum of the benefits expected by the added features. In particular, whereas the Patent Owner and the declarant further rely on the "combination of claimed features" to assert "unexpectedly improved properties," to the extent that there is some unexpected synergy with the combination of features claimed, the declarant has not established "an effect

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greater than the sum of the several effects taken separately." *Merck & Co., Inc. v. Biocraft Lab., Inc.*, 874 F.2d at 808. In this regard, we agree with the Examiner statement that whereas the Patent Owner asserts that "parallel air flow paths are part of the combination that works together to provide results, [] the O'Brien declaration does not state that tests were performed comparing a system with a bypass and a heat exchanger to a system having a bypass, a heat exchanger and the specific air flow characteristics. Without such a test, it is unclear what the statement that the arrangement of air passages improves the performance of the device is based upon." (RAN 47).

The Patent Owner asserts that the Examiner erred by requiring the Patent Owner to construct a hypothetical model for testing (Reb. Br. 5). However, neither the Examiner nor the Board requires such construction, and the Patent Owner misses the point. The Patent Owner is free to submit evidence it deems appropriate in support of its assertions of unexpected results. However, not all evidence is of the same quality and probative value, and ultimately, it is the Patent Owner that has the burden of proving unexpected results. *In re Geisler*, 116 F.3d 1469-70. Such burden has not been met in the present appeal. Whereas the Patent Owner has clearly asserted unexpected results, it has not set forth adequate evidence in support thereof that outweighs the strong prima facie case of obviousness.

CONCLUSIONS

1. The Examiner did not err in interpreting the claim limitation "in parallel with."

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2. The Examiner did not err in rejecting claims 12, 25 and 26 as obvious based on the prior art of record.

3. The Patent Owner did not establish unexpected results of the claimed invention through the submitted evidence.

ORDER

The Examiner's rejections of claims 12, 25 and 26 are AFFIRMED.

Requests for extensions of time in this *inter partes* reexamination proceeding are governed by 37 C.F.R. §§ 1.956 and 41.77(g).

AFFIRMED

ack

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CERTIFICATE OF COMPLIANCE

This brief complies with the type-volume limitation of Federal Rule of Appellate Procedure 32(a)(7)(B) or Federal Rule of Appellate Procedure 28.1(e). The brief contains 11,331 words, excluding the corporate disclosure statement, table of contents, table of citations, addendum, and certificates of counsel. This brief complies with the typeface requirements of Federal Rule of Appellate Procedure 32(a)(5) or Federal Rule of Appellate Procedure 28.1(e) and the type style requirements of Federal Rule of Appellate Procedure 32(a)(6). The brief has been prepared in a proportionally spaced typeface using Microsoft Word 2010 in 14 point Times New Roman.

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